University of Alberta

Technology Access and Equity Issues For Financially Disadvantaged Adult Learners in Post-Secondary Programs

by

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Sept. 15, 2000

Ellen Whybrow-Howes
Edmonton, Alberta

ABSTRACT

The purpose of this study was to explore technology access and equity issues for financially disadvantaged adult learners studying in post-secondary programs. A qualitative approach was used to achieve this purpose. Eligibility for provincially administered student finance grants during the participants' academic upgrading prior to entry at the post-secondary level was used as a filter to identify suitable participants. Participants were interviewed either during their post-secondary program, or shortly afterwards.

In an era where the necessity to have access to technology and be proficient in its use is an important key to one's economic status, the importance of technology is well entrenched in the minds of financially disadvantaged adults who are pursuing post-secondary studies for educational attainment and increased income security. While there are technology access issues for financially disadvantaged students in post-secondary environments, they were only significant for non-computer owners in highly technologically intensive environments. Although access was, at times, difficult, most participants did not perceive their circumstances as a significant hindrance to obtaining their educational and vocational goals as they had a variety of strategies to close the technology access and literacy gaps.

Highly technologically intensive post-secondary programs should continue to ensure that access to hardware, software and extra instructional services are available for financially disadvantaged adult learners. Academic upgrading programs can prepare students bound for such environments with streams covering initial content they may require.

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Faculty of Graduate Studies and Research

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled *Technology Access and Equity Issues for Financially Disadvantaged Adult Learners in Post-Secondary Programs* submitted by *Ellen Whybrow-Howes* in partial fulfillment of the requirements for the degree of *Master of Education in Adult and Higher Education/Instructional Technology*.

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CHAPTER ONE

INTRODUCTION

The rapid increase of information technologies in recent years is changing the nature of learning in post-secondary environments (Stephen and Beaudet, 1998; Menchaca, 1997; Government of Alberta, 1993; Resta, 1992). Tools such as wordprocessors, databases and spreadsheets, as well as telecommunication technologies provide students new conditions with which to obtain, manage, communicate and construct knowledge. Portions of programs or entire courses are delivered via information technologies making computer literacy and even ownership of hardware and software a prerequisite (Gates, 1998; Hopey, 1998; EDUCAUSE, 1998; Freeman, 1997; Menchaca, 1997; Milio, 1996; Rocheleau, 1995; Resta, 1992). Some programs, such as computer programming or engineering, require constant use of technology. Other programs, though not focused on technology, may require students to use technology frequently for a wide range of tasks such as accessing course content via the Internet, communicating with instructors and fellow students or simply wordprocessing assignments. In both types of programs, ownership of appropriate technology hardware and software provides students with, at the very least, convenience and, in other cases, a distinct advantage in terms of accomplishing their many tasks. As Gates (1998) notes, students, regardless of their majors, require access to information technologies.

A continuing dilemma in the field of adult education is the issue of access and equity for students from financially disadvantaged backgrounds; Levine and Nidiffer (1996) have found that post-secondary enrollment rates have improved for all students

with barriers to education with the exception of those students with economic barriers. The trend towards the use of information technologies provides, to a certain extent, a new barrier. Up-to-date information technologies continue to be costly and students who are financially disadvantaged, in some cases, have had limited access to these tools (College Board Online, 1999; Kozma and Croninger, 1992). Educators at the secondary level have studied and found links between home computer ownership and increased computer literacy (Mayer Nichol, 1992) and academic success in other areas (Rocheleau, 1995). The extent to which access and computer literacy is a barrier in adult education is not entirely clear and descriptions of financially disadvantaged adult students' experiences in this changing environment are not extensively detailed in the literature. Adult students obviously have different needs than children. For example, adult learners are frequently motivated in their learning projects to reach career goals (Tough, 1968, p. 21). As proficiency with information technologies is increasingly becoming linked with job and income security (Krahn and Lowe, 1998; Human Resources Canada, 1997; Milio, 1996), becoming proficient with the basic use of these technologies has become a key requirement for financially disadvantaged adults to realize vocational, and therefore, economic aspirations.

Purpose of the Study

Education has long been viewed as a means to equalize social and economic disparity within society; access to and equity in education are the characteristics which facilitate such equal opportunity. The purpose of this research is, therefore, to explore the following question: what is the impact of the current proliferation of information

technologies on access to and equity in increasingly technology intensive post-secondary education environments from the perspectives of financially disadvantaged adults currently enrolled in these programs in Alberta. The following sub-problems will be studied within this research: To what extent do financially disadvantaged adult students:

1. own computer hardware, software in their homes;

2. have access to computer hardware, software and the Internet if they do not own these tools;

3. have sufficient computer literacy with which to satisfactorily fulfill course requirements and reach overall goals in an equitable manner;

4. find financial and institutional support services useful in filling the gaps of computer literacy and access.

Everyone sees the world through his or her own experiences and personal interpretations. I am no different and can certainly point to distant memories of my parents' late night discussions, when they thought the children were asleep, on how they would pay the bills. It was their frugality and self-discipline which provided me the security and the determination to pursue an education and career as a young adult. It was their example which formed the foundation when recent social and economic upheavals forced me to reevaluate my role in the field of adult education and seek an advanced degree in middle age. Although my financial circumstances as an adult are far more comfortable than those of the people I interviewed, I found some parallels between their stories and my own in trying to obtain an education in an increasingly technology dependent environment.

A number of personal beliefs, therefore, underpin this study. First, financially disadvantaged adults are often less likely to own computers and computer tools because they do not have the money to purchase them. Because they are less likely to own computers, these students are probably more dependent on institution facilities and, in some cases, have less computer literacy compared to their peers. Some students may have developed certain strategies to deal with their circumstances such as scheduling their time to correspond with facility hours, partnering with peers and asking for extra assistance from professors. Finally, I believe that certain institutional strategies, such as workshops and staffed laboratories, may be of some assistance to financially disadvantaged students. This study will explore to what extent these students do find them useful.

Description of Terms

The following terms will be employed in this study:

Access in the context of learning refers to the ability to obtain an education, or more specifically, the resources need to obtain such, with minimal barriers. Access in education is a general term most often used to describe the condition of institutional openness to diverse and under served groups through altering or developing a variety of resources (Bergquist, 1995). This study will focus on the perceptions and experiences of one group, that of financially disadvantaged adults, in obtaining information technology resources to complete an education and reach educational and vocational goals.

Equity has a variety of interpretations. The definition chosen for this study most closely corresponds to that of "equal ends" (Wilson, N., 1998) or that of "vertical equity" (Guthrie, Garms and Pierce, 1988, p. 302). This definition states that through the right

support, it is possible for people of unequal status to attain a state of equality in terms of final results. Although educational institutes are unable to entirely remove the barriers of lack of technology access or prior knowledge, equity is still possible if disadvantaged persons are successful in their post-secondary programs and reach their educational and vocational goals. The participants, some by their own definition, all by a provincial standard, are deemed to be disadvantaged. This study will concern itself with the extent to which educational programs are able to support these students in reaching their overall goals.

Financially disadvantaged adults refers to those persons, aged eighteen and over, who were eligible and received assistance to further their education in the form of provincially administered grants. The method that is used to determine eligibility will be described in more detail in Chapter Three of this study.

Information technologies refers to electronic media, specifically computer hardware, software such as word processing, databases, or spreadsheets, and telecommunications technology such as the Internet, which are commonly used in the workplace and, increasingly, in post-secondary education programs.

The term technology intensive environment in the context of education refers to the means of, first, gaining access to the educational content and second, fulfilling the requirements for course completion. Both situations may require that students have regular access to or own appropriate information technologies. There may be a great range in terms of the intensiveness of the environments. A highly technologically intensive environment in education may include: content that focusses on technology; online courses

that require extensive access to the internet; courses requiring use and ownership of specialized computer tools; and support resources for courses such as resources posted on the Web or online journals. A less technologically intensive environment may still require the occasional use of computers or the internet for research and assignment preparation and presentation.

Significance of the Study

The literature suggests that a gap is occurring in terms of students' basic information technology access and computer literacy skills (College Board Online, 1999; Rocheleau, 1995; Kozma and Croninger, 1992; Mayer Nichol, 1992). Computer literacy is related to home computer ownership; the likelihood of home computer ownership increases with family income (Statistics Canada, 1999; Resta, 1992). Given the trend towards education dependent on information technology, it would appear that the conditions for providing accessible and equitable education to economically disadvantaged students are being undermined. This study looked at the extent to which financially disadvantaged adults find obtaining and completing a post-secondary education difficult in view of the increased importance of information technologies and what types of institutional response is most appropriate.

Most research in this area has been conducted in American secondary schools. Little research has taken place at the post-secondary level or in a Canadian context. Much of the research that does exist is quantitative data of the overall condition of access without a description of the issues of specific groups. Most importantly, while some educators may have a sense that some students are being left behind in the changing

format of education, there is little research into financially disadvantaged students' experiences and perspectives. This study, therefore, provides data and interpretation of phenomena at the post-secondary level that may provide useful information and analysis towards government student loan programs and post-secondary policies and services. The research also provides a thumbnail portrait of the early impact of technology on disadvantaged groups.

CHAPTER TWO

LITERATURE REVIEW

Defining the Population

One of the initial challenges of undertaking a study of this nature is defining the population to be studied. What is evident from the literature is that there is no clear or universally accepted definition of who is financially disadvantaged. The most frequently cited Canadian criteria in the literature consulted for this study are Statistics Canada's Low Income Cut Off's or LICO's (Colombo, 1998; Statistics Canada, 1992). These levels are set by adding 20 % to the average percentage of gross income spent on food, clothing and shelter. While not an official measure of poverty, LICO methodology concludes that families or individuals that spend 55 % of before tax income on basic necessities are likely to experience difficulty due to low income. Income tables in LICO's are adjusted for family and community size.

LICO's are used in publications concerned with Canadian social justice issues (Colombo, 1998; Edmonton Social Planning Council, 1997; Schellenberg and Ross, 1997) to provide quantitative data to supplement descriptive research and the thesis that poverty in this country is a growing problem. The use of LICO's to define and document poverty is not without criticism. Sarlo (1992) notes that definitions of poverty fall into the two categories of absolute and relative poverty. Absolute poverty is a state in which a person is unable to provide for even the most basic needs of food, clothing and shelter, while relative poverty is a situation in which a person's income is lower according to a defined level of average income. Sarlo (1992) documents the trend towards the use of relative

definitions of poverty and criticizes LICO's first, for including income which can afford more than the basic necessities and second, for the arbitrary selection of 20 % above basic necessity expenditure. Sarlo opines that some expenditures that some Canadians consider necessities are, in fact, social needs caused by societal pressures and questions whether the inability to purchase amenities of this category should be something with which social policy makers and Canadians as a whole should concern themselves. Sarlo contends that the majority of Canadians subscribe to the notion of absolute poverty, which is limited to the failure to afford basic needs such as nutritious food, adequate shelter, clothing sufficient for the climate and health and hygiene items. Sarlo does not directly state that toilets, televisions and telephones are outside this notion of absolute poverty, however, his use of statistics citing the prevalence of these items (p. 11 - 12), along with his thesis that poverty "has virtually been eliminated" in Canada (p. 2) lead one to assume that these amenities would fall into his definition of social, rather than basic needs. Although technology is not specifically discussed in Sarlo's work, it is assumed that he would consider it to be a social, rather than basic need.

Sarlo argues that the use of LICO's is misleading as people living below the cut off level can include students living away from middle class parents, pensioners whose largest expenses are behind them, and those who may choose an impoverished lifestyle for religious or other reasons. Sarlo's arguments are based exclusively on quantitative data and hypothetical case studies. Sarlo makes a credible argument that LICO's probably do include many who have low income, but are by no means disadvantaged. Exclusive use of LICO data is misleading in terms of the number of financially disadvantaged people in this

country. His use of data to calculate income required for basic needs is, however, narrow and as misleading. For example, quantitative data for calculating food costs is based on prices from one chain food store (p. 58 - 81). This evidence ignores the reality that such stores are often located in suburban areas requiring the use of a car; stores in the inner city may have different and higher prices. Sarlo included four case studies: the first is a young student who shares an apartment that has luxury items such as a swimming pool; a pensioner couple who are able to afford out of the country vacations; an actor who manages substantial entertainment and clothing expenses on a very limited budget; and a single mother who can feed her children nutritiously and afford a variety of family entertainment on a low income. While these case studies are possible, they would be more credible if they had either been based on real people or been properly labelled as hypothetical.

In response to the criticism of Sarlo and others, research divisions of more liberal or radical think tanks have, to a certain extent, begun to modify their use of LICO's. Schellenberg and Ross'(1997) study continues to use LICO's, however, it excludes unattached individuals and those persons aged sixty-five or over to concentrate solely on families. They conclude that regardless of how one measures poverty, it has increased in the last decade. Edmonton Social Planning Council (1997) divided LICO's in half and measured only those people who fell below this level. This criteria is even more stringent than Sarlo's measurements of absolute poverty. Their conclusion found that the numbers of families in the Edmonton area living in absolute poverty had doubled in the period from 1993 to 1995 to 5 % of the population or one in twenty.

These data support other evidence that, while the number of poor increase, the middle class is in jeopardy (Krahn and Lowe, 1998, p. 139) and mirrors trends happening in the United States, as well as other developed nations (Levine and Nidiffer, 1996; Milio, 1996; Davies, 1995; Council of Europe, 1989). There is a general consensus that not only the number of financially disadvantaged people is growing, but increasingly, this condition is more likely to be permanent than in the past, and that the overall gap between the richest and poorest people is growing. Detailed descriptions of who is more likely to be financially disadvantaged vary from author to author. Stephen and Beaudet (1998) detail the problems of women's poverty due to marriage collapse and low wages or job loss in sectors traditionally involving women. The authors also note that people with disabilities and aboriginals have significantly high rates of poverty. Although Sarlo (1992) argues that low income is not necessarily synonymous with disadvantage, he notes that those persons most likely to have low income are youth, the educationally deficient, recent immigrants, those who have undergone divorce or are single parents. Sarlo also notes that when the factors of marriage breakdown and single parenthood are removed, there are slightly, but not substantially, more women among the poor than men. In addition to some of the variables cited above, Schellenberg and Ross (1997) found that the age of the primary breadwinner in a family had a significant impact on variables which influence income such as length of unemployment.

A Big Picture View of A Growing Problem

The causes of economic hardship are numerous and the reasons why certain groups, such as women, minorities and the disabled, often find themselves in impoverished

circumstances are well documented in literature dealing with these groups. The literature review for this study will concern itself with why the financially disadvantaged, as a group, are growing in number in the last two decades of the twentieth century.

The problem of economic disparity is, by no means, unique to Canada or North America. Davies (1995) attributes growing poverty to unemployment due to globalization, which allows relocation of economic sectors to countries where costs are inexpensive (Fields, 1995). The vacuum created by job loss in such areas as the manufacturing or industrial sectors causes a structural shift to a predominance in the poorly paid service sector (National Literacy Secretariat, 1992; Robins and Webster, 1989; Wellington, 1989). A feature of this modern age is a focus on information, which is the largest commodity in service oriented economies (Haywood, 1995), and information technologies are the vehicle by which extensive use and exchange of information becomes possible and increasingly important (Council of Europe, 1989). The economy, therefore, has become increasingly technology dependent. The production aspect of service oriented economies involves people who create information, people who manage or communicate information, and people who process information. Krahn and Lowe (1998) have analyzed income and working patterns which exist within the Canadian economy and have arrived at the succinct label of "Good Jobs" and "Bad Jobs." This is a condition in which companies have increasingly moved to a structure revolving around a small core group of highly paid workers who are supported in their creation, communication and management functions by a periphery of part-time or contracted unskilled, semi-skilled and even skilled staff. The authors' analysis of the Canadian workforce is supported by data from the National

Literacy Secretariat (1992) and is similar to trends found elsewhere in the world. Haywood (1995) and Robins and Webster (1989) see the global workforce being divided into well and poorly paid information workers. The highly paid, Haywood predicts, will continue to ask for more, while the poorly paid will be asked to be increasingly flexible and endure greater periods of unemployment.

Up until the 1980s, Canada's strong social safety net (McAdie, 1998) and social service oriented economy (Krahn and Lowe, 1998) provided some measure of security within the workforce. McAdie blames the fiscal policies of the late 80s and 90s for a deteriorating standard of living. Krahn and Lowe (1998) observe that such changes have brought the Canadian economy in line with the U.S. economy, where more people are employed in the service sector. These more liberal, even radical views, of the restructuring of the Canadian economy are, to some degree, affirmed by the more conservative point of view; Lipsey (1996), in a lecture to the C.D. Howe Institute, notes that technological change has changed economic patterns and the way in which people earn and maintain a quality of life as remuneration and job growth have been unequal in various sectors.

The Relationship Between Technology and Economic Disadvantage

The role of technology in economic restructuring, alluded to in the above section, is significant. Just as the Council of Europe (1989) and Robins and Webster (1989) predicted that information was the essential feature of the modern era, information technologies have led to substantial restructuring of world economies. Milio (1996) chronicles the development of the information technology infrastructure which, once in place, resulted in the job loss of half a million clerical workers and job growth for 120,000

software personnel. This shift in employment patterns had a dramatic and negative effect on women's employment. By the 1990s, the labour market had significantly changed. People who were unemployed were unemployed for longer periods of time; many could not return to old jobs as technology had eliminated the work or reduced it to part-time. This restructuring of the economy by information technologies is affirmed by the business management field. Business Week (1993, p. 57 - 79) reports that workplace reorganization focussing on short-term contracts and part-time status has resulted in net job loss.

The fact that almost every job in the future will be linked to information technologies in some way has been well documented (Wismer, 1998; Milio, 1996; National Literacy Secretariat, 1992). Canadian sociologists, Krahn and Lowe (1998), have devoted an entire chapter in their publication, *Work, Industry and Canadian Society*, to analyze computer use in the workplace. The authors have found that patterns of computer use match work rewards across the labour market. Those workers who typically receive more money, benefits and training, are more likely to use computers and use them in more advanced ways. Their use of computers means that they are more likely to be developing transferable skills, which improve their future economic prospects. The authors' analysis raises the question of gradual *"enskilling or deskilling"*(1998, p. 106) through computer use or lack of use in the job market. Data on computer use and skill development have strong parallels with Malicky, Dieleman, Campbell, Wong, and Krahn's (1998) panel discussion summary of basic literacy skills and their development in the workplace. Just as reading and writing skills are crucial to finding employment, these basic skills are

reinforced in the workplace, ensuring future prospects for the skilled and preventing economic and career improvement for the unskilled. It would appear that information technology skills follow similar patterns; if an individual does not use technology in a challenging way in his or her work, then whatever skills the individual has could be lost or decrease like basic literacy skills.

The "Good Jobs/Bad Jobs" syndrome and information technology structure affects not only the poorly educated or those lacking basic literacy skills. Fields (1995) theorizes that countries with well educated workforces which are overqualified locally or unemployed will have lower labour costs. It would appear that information technology infrastructures and restructured economies, supported by free trade agreements, could enable the development of a class of migrant professionals.

The economic restructuring described above, which sees a smaller group of well paid information workers supported by a lower paid periphery is, in some writers' views, made possible by a profound shift in societal values. Schwab (1995) attributes the above divisions to the increased eminence of information as a commodity taking place in a global market economy, where value systems are replaced by quick messages packaged for multimedia environments. Societal values, once transmitted through local culture, country or religion are being replaced by consumerism and the notion of inevitable globalization. McQuaig (1998) details the widespread acceptance of futility, lack of political will and even morality as people's livelihoods are displaced through globalization. Labour has become expendable as plants and service departments can be relocated elsewhere. The implications of globalization touch everyone. Within the global community are the core

information workers who, in the course of their day, may communicate more often with a division head in Bombay than a counterpart in British Columbia. The information workers, or technology "haves" may supervise or contract with others, often technology "have nots." Both Shanahan (1992) and Lipp (1995) observe the lack of communication and commonalities between technology "haves" and "have-nots." The values of these groups may not be in sync causing further isolation on the part of these two groups. Lipp (1995) notes this division in the context of globalization and alludes to the increasing isolation of technology users from the economic conditions of others. The problem arises when the designers and users of technology, through their power and economic advantage, are able to make decisions affecting the community as a whole and possibly exacerbating the divisions already present.

Economic Restructuring and Adult Education in the Information Society

As the economy has undergone quick and radical restructuring, the role of adult education has changed as well. Wellington (1989) summarizes what he views as the demise of the liberal traditions in education. A generation ago, completion of secondary school guaranteed a certain measure of economic security at a reasonable standard of living. As the population experienced job loss through restructuring, the value of an education was undermined. Traditional goals of broad based education were questioned as irrelevant or outdated in the modern world and increasingly replaced by training and vocational education initiatives, which were seen as providing students with the tools necessary to achieve and maintain a quality of life. Robins and Webster (1989) also saw this shift in adult education towards an instrumental orientation, as the lines between

education and training became increasingly blurred. The authors saw education as the primary mechanism for producing people with the skills and attitudes needed by the new economy.

A decade later, Stephen and Beaudet (1998) affirm that there is increased pressure on adult education providers to respond to interests of the economic sectors and individual students' desires for increased employment opportunities. Adult students are upgrading to find work or even just to keep from losing their jobs. While recent unemployment statistics have shown a downward trend, income inequality is widening with the richest quintile of the Canadian population capturing a record portion of the total income while the poorest quintile's portion fell to its lowest in the 1980s and 1990s (Globe and Mail, as cited in Hurtig, 1999). These statistics continue to be affirmed at the time of this study's latest revision; the Globe and Mail (2000) recently reports, "The average Canadian family is now officially better off than before the hard times of the early 1990s, but only because the rich have got richer faster than the poor got poorer." McQuaig (1998) notes that while overall economic recovery has been remarkable, "the economic well-being of the average Canadian has actually deteriorated over the past ten years" (p. 29) leaving many with uncertainty over the future. These fears have led to a heightened concern for employability as a theme in adult education courses, which has led to a polarization matching the restructuring taking place in the economy. Stephen and Beaudet (1998) have noted two main streams of adult education: one provides formal recognition through certification; the other is designed for basic employability skills with the goal of quick main streaming back into the job market, without necessarily significant

training. While the above view may seem alarmist, it is, to some extent, consistent with the principles of human capital theory (Taylor, 1997) and calls from the business sector for increased investment in human capital (Lipsey, 1996) through education.

One of the results of the shifting economy has been a high interest in information technology courses; Taylor (1997) reports that technology has been a growth area for adult education institutions. Technology is publicized, not only for its link to employability, but also for an ability to improve one's social well-being, opportunity to participate in democratic institutions and the future prosperity of one's children. The author notes that these publicity efforts are aimed more at technology "haves," rather than "have nots." Offerings for the "have nots" tend to be directed towards quick integration into the job market as observed by Stephen and Beaudet (1998). Taylor criticizes the typical adult education response to economic restructuring as based upon the mistaken belief that unemployment is a temporary phenomena. Earlier, the Council of Europe (1989) optimistically saw information technology as the hope for displaced workers in the labour market. In the same year, Wellington (1989) observed that many educators and policy analysts attributed unemployment to a skills deficit, which stated that people are unemployed due to a lack of required skills. The author questioned whether technical skills training made people more employable when, given the service - oriented labour market, it would appear that general attitudes, disposition and communication skills are more important. In a similar vein, Robins and Webster (1989) questioned whether there was that great a shortage of information technology workers that wholesale massive training of the unemployed would solve. Even if everyone could be trained as a technologist of some

sort, there would not, in these authors' views, be enough jobs to go around, and the unemployed would still have to seek their living in lower paid jobs within the service sector. If this is the case, an emphasis on information technologies would have dubious value to improving the condition of the financially disadvantaged and that the links between information technologies, adult education and the economy are in need of ongoing critical examination.

Information Technology and Adult Education - Four Perspectives

As society is being transformed by the information age, so is adult education. Information technologies on post-secondary campuses have become increasingly evident; the presence of computer facilities, standard issuing of email addresses and the use of the Internet for program delivery are examples of its ubiquitousness. This shift to the use of information technologies shows no signs of abating. Adult Learning (1993) stresses the trend towards alternative delivery through the use of computer-based technology and increasingly, departments of post-secondary campuses require not only the prerequisite computer skills, but the ownership of necessary hardware, software and Internet connection as a condition of enrollment (Gates, 1998; Hopey, 1998; Freeman, 1997; Menchaca, 1997; Milio, 1996; Resta, 1992). Access to information technologies is not only important, in some cases, it is progressively becoming a necessity.

Whether general educational need is being met by information technologies or these technologies are, in fact, creating the need, depends on the source consulted. Educators have differing opinions on how information technologies should be

incorporated to support educational goals. Below are summaries of common viewpoints I have identified from the literature consulted for this study.

Traditional Goals-New Format

The notion of information technologies as keys to equity, access and quality is a recurrent theme in the literature (Congress of the U.S., 1993; Guthrie, Garms and Pierce, 1988; Senese, 1984). This point of view states that information technologies provide low cost learning opportunities which, in turn, lead to greater educational access for all and increased equity for those most marginalised in education through greater individualization and interaction. Computer programs that address a wide range of instructional and remedial needs allow students to work at their own pace until mastery of concepts is achieved. This reduces the need for extra instructors, instructional aides and their associated costs. Information technologies, it is argued, will therefore enhance the traditional goals of education. Very little will change in the overall objectives of education except content may be delivered by instructor, computer managed instruction or a combination of both.

This view builds upon the notion that access to technology will increase dramatically and become so common that its presence will permeate society at all levels (Sargent and Tucker, 1997). Increased access will allow current content to be reformatted to suit the technological environment. A frequent theme in this viewpoint is flexibility or access to learning; students will be able to access learning at the time and place and in the format that fits their needs.

Human Resource Model

A more extreme view holds that the traditional goals of education are quickly becoming redundant and education should undergo wholesale transformation to meet the needs of an information-based society (Groff, 1994; National Task Force on Educational Technology, as cited in Saettler, 1990, p. 465 - 467; Council of Europe, 1989). The current efforts in both secondary and adult education are failing to prepare students for the future and a remodelling of these institutions similar to corporate organizational structures and goals is necessary. While acknowledging many diverse and complex barriers which need to be addressed to assist the disadvantaged, Groff (1994) advocates greater strategic planning on the part of both secondary and post-secondary institutes to ensure that workplace competencies are addressed. An educational institute's role is to ensure the development of tomorrow's worker. An emphasis on information technologies is a key to the fulfilment of the purpose of education, namely its human resource development function. The emphasis in this perspective is the connection between educational content and the roles graduates would fulfill in the information society. The Council of Europe (1989) had earlier identified the roles of information creation, transmission and processing as future growth employment trends. If we combine this early prediction with Krahn and Lowe's (1998) analysis of workplace computer use and rewards, we see that education can be modelled to prepare students for a variety of roles in the new workforce. Traditional concepts of literacy in this philosophical orientation would then be subsumed under the more advanced skills of information processing, critical thinking and problem-solving.

In the above view, educational institutions will need to be highly technologically intensive environments. In one such example of this perspective, Former U.S. House Speaker, Newt Gingrich (as cited in Chapman, 1998, p. 64) endorsed the idea of complete replacement of all school textbooks with computers. Ideally, all students in programs following this model would be equipped with appropriate technology. It will be technology, rather than previous formats of classroom, teacher or textbook that will be the vehicle through which the majority of learning takes place.

Broad Based Education Model

Ruben (as cited in Saettler, 1990, pp. 395 - 396) takes a different view of the goals of education and argues that, while the notion of literacy has broadened in response to the increase in information technologies, the term computer literacy is but a subskill of the more complex abilities of reading, writing and numeracy. Information technology is not the focus in this view. Unlike the Human Resource model, which has as its overall objective, the development of workplace competencies, the Broad Based Education model rates the development of graduates' employment skills as important, but not its only objective. As in the Human Resource model, the focus would be on higher order thinking skills, however, technology would only be one of the many tools by which thinking skills would be developed. This argument logically leads to questions about the importance of information technology in curriculum and whether it should assume the status of subject area in education or be replaced by a focus on Ruben's notion of higher order literacy.

Ruben's argument is supported by surveys of employers' perceptions of necessary or valued competencies of new graduates. The University of Nevada's (1994)

survey found that while computer skills were valued by over half of all employers, they were far behind in importance compared to general communication, interpersonal and cognitive skills. Earlier, Wellington (1989) found employers sought a good foundation of broad knowledge; computer literacy, while important, was easily obtainable by an educated person. Both surveys highlight one of the purposes of education and a major reason that many students, and financially disadvantaged students in particular, enroll in higher education.

Power Based Model

Finally, a fourth view of how adult educators should respond to information technology has emerged in the nineties. In this view, education must focus on the connection between information and power (Iseke Barnes, 1992) and provide users the opportunity to critically examine information technology so as to recognize the dominant values being presented. Questions such as who benefits the most and how from technology need to be analysed by learners (Shanahan, 1992). Kozma and Croninger (1992) emphasize that, for disadvantaged students in particular, it is important that information technology connects to content that is important to the students, where their values, culture or community are presented. Both Milio (1996) and Shanahan (1992) emphasize that it is imperative that financially disadvantaged or unemployed persons not only develop their information technology skills, but that they learn to use these tools for self-advantage and for the benefit of their communities. Both Shanahan (1992) and Merrifeld and Bell (1994) advocate for a shift in curriculum from computer based skill acquisition to helping

students become producers of knowledge. This shift would better address their particular social or economic problems.

Of the four views described, it would appear that only the Power Based Model focuses on the needs of marginalized groups. However, as Milio (1996) points out, while it is advantageous to design curricula, educational products and technology systems with the users in mind, educational institutions cannot afford to put financial resources into this type of development. Kozma and Croninger (1992) have observed that, at the secondary level, many educators do not have the time to make full use of the potential of technology and make only minimal adjustments to fit information technology into their existing practices. It may be logical to assume that post-secondary educators have similar time constraints and adjust accordingly. Meanwhile, provincial funding (Government of Alberta, 1997) and financing particularly for disadvantaged groups (Alberta Advanced Education and Career Development, 1999) are focussed on the human resource potential at the adult level. If this is the case, it would appear that the Traditional Goals, New Format and the Human Resource Models are the viewpoints which will shape the use and integration of information technology at the adult level.

The arguments over the importance of information technologies in education are numerous, however, the fact remains that these technologies are used extensively and this trend will no doubt continue. This is especially true as provincial funding in Alberta is increasingly tied to supporting technology integration in the post-secondary system (Government of Alberta, 1997).

In summary, computer access and literacy have been linked to one's future social and economic status (Krahn and Lowe, 1998; Menchaca, 1997; Milio, 1996). In Canada, government documents such as the National Literacy Secretariat (1992) correlate computer illiteracy with low skilled and poorly paid employment while high levels of post-secondary education, which increasingly uses information technologies, is linked to highly skilled occupations (Adult Learning, 1993). As these documents are duly reported in the media, this viewpoint has become entrenched in popular notions of what constitutes a good education. Other authors (Wellington, 1989; Robins and Webster, 1989) question the notion of computer literacy resulting in enhanced economic status.

Computer Access, Equity and Literacy

While researching this study, I came across the acronym "PONA," which means "Persons of No Account" and is used by those heavily committed to cyberspace to describe people who are not online (Schwarz, 1996). While the use of such terms may be offensive, the consequences of not being technologically proficient, or more specifically online, have begun to have a detrimental impact (Menchaca, 1997; University of Wisconsin, 1996; Milio, 1996). Access to information regarding public and private assistance, basic needs, employment, education, training and sometimes certification are increasingly, and sometimes exclusively, offered online. The need to be online and the need, described earlier, to be technologically proficient are both quickly evolving into quality of life issues. In Menchaca's opinion, the connection between being online and one's educational and economic success are increasingly connected; as educational attainment is tied to getting online, so will one's economic security.

Earlier, Senese (1984) predicted that computers would be as common as televisions. In more recent times, Sargent and Tucker (1997) continue to predict the proliferation of computer technology in society just as mass distribution enabled the wristwatch to replace the town hall clock. These authors provide British data which compare computer ownership rates with television and phone ownership rates; all show an increase with computer ownership substantially rising. Milio (1996) also observes that American data show that one-third of all households own computers and implies that ownership rates may follow television and telephone patterns. The most recent data from an American source indicate that telephone ownership has stabilized at 94 % and computer ownership and Internet access are significantly tied to income as well as other factors such as race and geographic location (National Telecommunications and Information Administration, 1999). Milio's predictions regarding computer ownership appear to be supported by the latest data from the U.S. Census Bureau (1999) documenting computer ownership as of October 1997 at 36.6 %, up almost 14 % over 1993. If current rates of ownership continue, over half of all American homes have computers at the present time.

The belief that computers will permeate modern life as televisions and telephones have builds upon the assumption that the latter are almost universal. In preparing for this study, I came across two sets of data: the first, cited above, were quantitative data taken from surveys; the second, were examples of real people whom the advantages of technology had passed by. Menchaca (1997) cited a friend who, as a high school principal of an inner city high school in the U.S., regularly visits children's parents in their homes as

these parents do not own telephones. A listserv I belong to had a recent contribution from a member who observed that among her staff at a Southern U.S. rural nursing home was a person too poor to own a telephone even with a regular pay cheque (Instructional Technology Forum, 1999). While these data are not from standard peer reviewed sources, they remind the reader that the "unconnected" are often very difficult to count.

Among those who can be surveyed, it is fairly obvious that technology, more specifically computers and internet access, are not distributed equally across income groups. The College Board Online, (1999), National Telecommunications and Information Administration, (1999), Milio (1996) and Rocheleau (1995) observe that income plays a big part in determining who owns a computer. Resta (1992, p. 120) cites National Assessment of Educational Progress statistics that report minority students come from families which earn 50 to 60 % of the average income of most computer owners. The National Telecommunications and Information Administration (1999) has noted the "digital divide" (computer ownership and internet access) is widening.

Serious inequities also exist in school districts which, one would hope, would be able to resolve some of the gaps between technology "haves" and "have nots." Schools in low socio-economic districts are less able to devote much of their budgets to technology purchases (Hopey, 1998; Menchaca, 1997) and have fewer computers and higher student to computer ratios (College Board Online, 1999; Menchaca, 1997; Milio, 1996; Rocheleau, 1995; Kozma and Croninger, 1992; Resta, 1992).

Most of the authors cited above concern themselves with access issues as they relate to children. There is a paucity of information on computer access and literacy and

the needs of the economically disadvantaged adult students, so it may be more advantageous to look at these constructs as they were studied in other groups to speculate as to their transferability. I considered studies of children and computers to be relevant as prior knowledge obtained through secondary school experiences may carry through to the post-secondary level (College Board Online, 1999).

Computer literacy can be gained through a variety of access situations. Resta identifies four such situations for children: school, extra-curricular computer courses, home computer use and public access through library use. One can, no doubt, substitute work access as detailed by Krahn and Lowe (1998) for adults in place of school access. A major construct affecting computer literacy in the research consulted for this study was computer ownership. Clearly, computer ownership correlated positively with other constructs associated with academic achievement. For example, in a study of sex differences and computer attitudes, (Levine and Gordon, 1989) children of both genders who had computers at home had more positive attitudes to computers, perceived their own abilities more positively and were motivated to learn more about computers. The construct of computer ownership in this case appears to have an indirect effect on positive attitudes. Ownership increased computer exposure which contributed to increases in positive attitudes and perceived ability. Positive attitudes and perceived ability enhanced motivation to learn more about computers which caused increased exposure. The relationship in this study appears cyclical. These findings were not entirely replicated in another study (Levine and Donista-Schmidt, 1997), which found that increased computer exposure caused positive attitudes and a commitment to learning more about computers

but also caused increased confidence, which had a negative effect on the commitment to learning more. The authors hypothesized that self-confidence may lead students to feel that they need not attend further to instruction. The relationship is, therefore, more complex than previously anticipated. It is, however, evident that computer ownership provides children with some advantages. It would also be logical to assume that the availability of school laboratories would alleviate the inequities of between computer owners and nonowners but this is not the case. It is the students with computers at home who are more likely to use school computer facilities (Mayer Nichols, 1992; Rocheleau, 1995). Their increased exposure to computers at home may give them the background to make better use of school facilities.

Of primary concern to educators is the effect of computer ownership on academic achievement. Consistently, at all levels of secondary schooling, computer ownership corresponded with general academic success (Mayer Nichol, 1992; Resta, 1992) and success in English and Math (Rocheleau, 1995). In post-secondary computer science courses, home computer ownership was significantly related to academic success (Taylor and Mounfield, 1994) and increased proficiency in problem-solving (Widmer and Parker, 1985). Home computer ownership increases one's chances of being computer literate and successfully performing in a technology dependent environment. A poor level of computer literacy detracts from learning in some obvious ways. The student is at a disadvantage in accessing information and presenting assignments with the full range of tools available (Resta, 1992). Iseke-Barnes (1996) reports that students with low levels of computer literacy are at a disadvantage in participating in email exchanges and

conferences and Ross's study (1996) found such students have less influence in group computer mediated instruction, miss important instruction because too much time is spent in basic computer mediated tasks and self-regulate to the least demanding and potentially least beneficial learning tasks. Finally, accusations have been made, although not proven, with regard to computer users' performance on tests compared to non-users (The Edmonton Journal, 1999).

Besides computer ownership rates and the increased access that ownership brings, how technology is used also impacts one's information literacy. Milio (1996) makes an interesting case for "technological equity," without which, she fears, the achievement gap between the groups will widen irrevocably, to the detriment of the disadvantaged. Equity, in this sense, will be more than ensuring equitable numbers of computers per school or that everyone owns a computer; it will require a fundamental shift from an information dispensing format to discovery-centred methods (Milio, 1996; Haywood, 1995). The difference between "haves and "have nots" will be the ability to access and use information successfully. These authors predate the first publication of information literacy standards by the American Association of School Librarians (1998), which defines an information literate person as one who is able to effectively access, critically evaluate and accurately use information as a self-directed and socially responsible learner.

Once again, the literature suggests that income disadvantaged students are not receiving the type of instruction that the above goals require. Instead, there is substantial evidence that students in low socio-economic schools receive inferior computer

instruction, which emphasizes drill and practice and lower order thinking skills (Milio, 1996; Kozma and Croninger, 1992; Resta, 1992), while students from high income schools spend more time making judgements, inferences and evaluations of the content. "Affluent students are thus learning to tell the computer what to do, while less affluent students are learning to do what the computer tells them" (Watt, as quoted by Resta, 1992, p.122).

These disparities are not exclusive to the secondary level; Merrifeld and Bell (1994) found that drill and practice computer instruction and criterion referenced computer programs dominated Adult Basic Education classes. Kozma and Croninger (1992) observe that as disadvantaged students are frequently managed by, instead of acting on, technology, it is the technology itself which will further create disparities between high and low income students.

Addressing Inequities

Some authors (Tapscott, 1998; Russell and Holmes, 1996) see the differences in computer literacy as generational; the children growing up with computer technology and the Internet today will be the technologically fluent adult learners of tomorrow. Yet, even by Tapscott's own admission, there is a substantial gap in children's computer access, which is, as discussed earlier, linked to financial status. It would appear that, at least for the foreseeable future, students entering adult education institutions will not be starting on an equal footing. It is, therefore, imperative that such institutions consider policy initiatives to ensure equity and access for all.

Freeman (1997) observes that student populations at post-secondary institutions are becoming increasingly diverse and that educators in programs that extensively use technology must increasingly accommodate students whose limited financial resources have resulted in limited experience. A survey of the literature for this research indicates two broad areas from which solutions can be developed. The first is within the communications industry itself. Whether the industry should be encouraged through incentive to contribute to the infrastucture needed to create equal access, regulated through policy or left alone to market forces has been fiercely debated in Educom Review (Cerf, Huber, Duggan, Gilder, Nader, Irving, Breeden, Perelman, Robinson, Schrader, Weingarten, 1995). A second approach is based on government support of community based projects. Milio (1996) and Menchaca (1997) advocate the integration of technology into disadvantaged communities through the involvement of community members in fundraising, decision-making as to technology's integration with other community resources, content development and even linguistic style of community web sites or multimedia resources. Both authors stress the importance of community centres where the disadvantaged empower each other to use technology to become income earners, idea providers and participants in democratic institutions.

While the vision of industry and government involvement is intriguing, this research will concern itself with the more pragmatic solutions available to post-secondary institutions categorized as either instructional strategies, support services, and philosophical models.

Instructional Strategies

Numerous authors such as Taylor, 1997, Milio, 1996, Haywood, 1995; Kozma and Croninger, 1992, point to the need to shift from an information transmission approach to learning to a discovery based model. This debate has continued in education for some time without definite resolution (Illman, 1998; Jonassen, 1991). There are two aspects of technology, however, which add to the debate. First, educational technology has, in most cases, added to the cost of education (College Board Online, 1999). These increased costs have created budgetary pressures that make curriculum revision difficult to achieve; most educators end up using technology to fit into their existing practices, rather than encourage information seeking skills (Haywood, 1995). Drill and rote activities, which dominate learning activities in poor school districts, should be replaced by interactive and student directed learning that embeds the learning of basic skills in activities requiring higher order thinking (Merrifeld and Bell, 1994; Resta, 1992).

The other aspect of technology that may provide a barrier to its use among the "have nots" are the values attached to the medium. Menchaca (1997), Iseke-Barnes (1996), and Kozma and Croninger (1992) all point to the cultural and linguistic barriers that disenfranchised groups have in using information technologies. Iseke-Barnes (1996) documented the problems encountered by inexperienced users in web conferences who may be intimidated by the white, middle-class values of the majority. Even searching the Internet is problematic because the act of searching is the result of knowing the right language. Kozma and Croninger (1992) stress the importance of connecting students to

Internet sites where their values are dominant. The authors also stress the importance of pair and group activities for the disadvantaged to offer peer support with the learning.

Several authors point to the need to ensure that student exposure to technology, especially if it is their first contact, be structured for a positive experience. Levine and Donitsa-Schmidt (1997) suggest that frequent discussions and attitude surveys be conducted to gauge student interests. Levin and Gordon (1989) also stressed the need to develop a positive mind set in students within an effective orientation to computers. The studies of Taylor and Mounfield (1994) and the University of Wisconsin (1996) both document the advantages of having a pre-college computer courses for disadvantaged groups to provide an orientation and psychological readiness to technology intensive environments.

Support Strategies

Increasingly, having a computer is a necessity, even a prerequisite for post-secondary studies (Gates, 1998; Resmer, Oblinger, and Mingle, (1995). Gates (1998) is preoccupied with the technical aspect of this need rather than the social need, while Resmer, Oblinger and Mingle (1995) recognize the difficulty this may pose for some students but state the advantages are too great to ignore. These authors see the cost of ensuring that every student has a computer as an item that must be equally shared between the institution and student and propose lease or buy plans to make this happen. McKinney (1996) sees the benefits of technology integration into the curriculum as greater flexibility and creativity to instruction. At the same time, the cost is horrendous, particularly for community college budgets. To provide, at the very least, upgrading every three years and

replacement of computer systems every six, McKinney recommends a student technology fee to alleviate these costs. While this fee might help with upgrading and maintenance costs, it in no way pays for the large transformation required as technology evolves. McKinney acknowledges that the added costs in the 90s for internet access, student email and multimedia development has driven the cost of an education out of the reach of some. Levine and Nidiffer (1996) state that, for the poor, even the need for small amounts of money can be a deterrent and documents that post-secondary rates have improved for all disadvantaged groups except the poor. The authors state that the traditional method of education as a means to economic improvement is becoming inaccessible. Whether technology is really meaningful for those in dire socio-economic circumstances is debatable. If education for the economically disadvantaged is a means to employment and economic improvement, then there is little need to focus on the latest, expensive technology. Most employment has been created by small employers who usually lack the latest equipment. Instead, the focus should be on transferrable skills of problem-solving and trouble-shooting, which are ultimately more useful in a corporate environment.

Guthrie, Garms and Pierce (1998, p. 298) saw technology as having the potential of improving equity throughout school systems through individualization. Kozma and Croninger (1992) also saw this potential, however, stated that technology was unlikely to solve inequities as long as the real problems of prejudice and disadvantage remain at large. They saw the need for school policies to be in place to minimize the disruptions caused by poverty. To focus specifically on technology for adult learners, Menchaca (1997) suggests plans to build exposure for low income users. This author is in favour of 24 hour access to

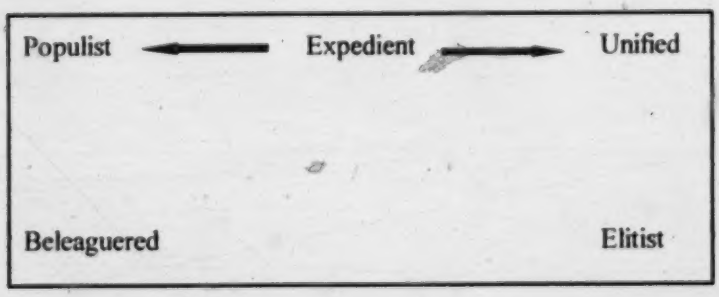
labs or students borrowing computers to take home. In a more pragmatic approach. Resta (1992) sees the need to develop strategies to encourage participation of disadvantaged groups such as:

- staffed labs
- student buy plans to facilitate computer ownership
- supporting research and development to enhance use by the disadvantaged
- computing workshops for secondary teachers of the disadvantaged
- special programs for disadvantaged students to gain technical skills to integrate into a technology intensive environment.

Philosophical Models

Finally, it is imperative that institutions critically reflect on and define how the term access should manifest itself within the institution. Bergquist (1995) has identified five perspectives on access and has related them to the quality of the institution as shown in the following diagram:

High Access



Low Access/Quality **High Quality**

Figure 2-1

The elitist perspective justifies its position of low access to underserved populations by concentrating on high quality education to future societal leaders. Only the best of the disadvantaged need apply. The populist perspective, with its mantra of education for all, focusses on successful graduation and career preparation, not necessarily the quality of the educational experience itself. Access is increased through efficiency and low cost. The beleaguered perspective, as its name implies, is one in which scarce resources make quality and access impossible to achieve. The expedient perspective sees quality education and access as incompatible goals and chooses one over the other as funding sources dictate. Bergquist's thesis is that the Unified perspective, where the commitment towards access and quality can co-exist, is possible. Quality is defined not only through job placement and successful completion rates, but also by the institution's contribution to the larger community through less trackable measures of success. Emphasizing quality, in turn, attracts students and increases the diversity that is needed to bring about multiple perspectives and a quality educational experience.

Taylor (1997) notes that technology has confused and sidetracked many over the issue of access and what it means in education. Educators are becoming fascinated with information over knowledge, delivery over education and technical feasibility over access. The race to be accessible through the latest technologies diverts the focus from access to those in underserved populations who want and need a post-secondary education. Taylor's article reminds administrators that they must focus on what to teach and not just on how it will be delivered.

CHAPTER THREE

DESIGN OF THE STUDY

Research Design

All of the research related to financially disadvantaged students' use of technology found for the literature review for this work was quantitative. Using qualitative methodology to develop an understanding of students' experiences in this time frame was a natural choice in order to develop depth in terms of learners' experiences and perceptions. The nature of my research is exploratory and so the method used was open coding as described by Strauss and Corbin (1990) with Patton's approach (1980) used for the development of the interview questions.

I wanted to discover the experiences of financially disadvantaged students in a post-secondary environment with respect to technology. This posed a problem. First, many students consider themselves financially disadvantaged and, if we look strictly at income, most are. As Sarlo (1992) had pointed out, a student who has low income for a few years while completing his or her studies is not disadvantaged if he or she has other resources such as parents. Since the literature review demonstrated that there is no one way to measure the term financially disadvantaged, I needed to find a way of limiting the participants in a way that was considered legitimate by some measure. I decided to choose the criterion of being eligible for provincially administered Student Finance Grants (1999, p. 7) which states "financially disadvantaged adults who are unemployed and unskilled may be eligible to take programs to upgrade." These programs provide upgrading or entrance eligibility to a number of post-secondary programs, whereupon the student can

apply for student loans to continue or go directly to employment. Students who are eligible for such grants while upgrading and then proceed to a post-secondary program while at a similar income status or less would be eligible. I, therefore, decided to interview current or recent post-secondary students who had been enrolled in an upgrading program with a Student Finance Board grant prior to commencing post-secondary studies.

While the advantage of using eligibility for Student Finance Board grants gives this work some legitimacy in providing a filter, it also had some drawbacks. One of the participants who was eligible for this study had, in fact, amassed a good reserve of income before his health started to deteriorate. He had, prior to his difficulties, managed to pay for his home and had been a long-time computer owner or user. When determining a person's eligibility for a Student Finance Board grant, the Alberta provincial government only takes into account the financial status of the individual for the previous year. According to Sarlo (1992) and many others, this person does not qualify as being poor. I decided to use his information, however, for two reasons. Given his circumstances, had he chosen not to upgrade his education, he most certainly would have lost most of his savings. Secondly, the nature of the economy with downsizing and cutbacks in services has created many instances of people who join the ranks of the disadvantaged for, it is hoped, a temporary period. I considered this individual's circumstances of losing work due to health reasons, trying to start a small business and living off his savings for the two years prior to going to school to be a sufficient period to qualify for this study.

Another limiting aspect of tying participation in the study to eligibility for student finance grants was that one of the qualifiers for eligibility was a certain amount of

demonstrated stability in the recipient's life. I garnered this information from interviews with staff from the Student Finance Board and through staff training manuals (Alberta Advanced Education and Career Development Library Services, 1997) for this position. This could include residential, marital or job related stability. Stability is a problematic term in describing financial status as it can be a cause or a result. A stable person may have increased financial status because he is she is not dealing with the inevitable problems that go with job loss, marital breakdown or other problems. At the same time, a person who has the good fortune to have increased financial status through getting that fortuitous job, marriage or other circumstances may enjoy more stability in other areas of his or her life. Stability as part of qualifying criteria for student finance grants means that, for this study, many people who qualify as being financially disadvantaged are ineligible for funded further training. Many, although not all, of my respondents were in the upper echelon of the financially disadvantaged and would not be considered disadvantaged by the criteria that Sarlo (1992) uses.

Eligibility also excluded potential participants. I interviewed one person who had severe and progressively worsening disabilities. She could no longer easily find work, however, she had, prior to the severest stages of her disability, completed a university degree. Because she had a degree, she did not qualify for a grant from the student finance board. She was, in terms of income and quality of life issues, perhaps one of the most "financially disadvantaged" of the participants that I interviewed.

Institutional Context

Once I had a filter, I approached an institution that provides academic upgrading programs and whose students are largely funded through student finance grants. I wanted to compare computer ownership rates in a population of financially disadvantaged adults with the Canadian norm, and I wanted to interview recent graduates of the institution who had gone on to post-secondary training. One institution generously offered to allow me to survey two classes for home ownership rates and to mail out a letter soliciting participation in the research to its previous year's graduates.

The institution I worked with was located in a large urban centre and specialized in academic upgrading, ESL and short skill training programs. Approximately 67 % of the students in the institution's academic upgrading program received provincially administered student finance board grants or bursaries. The population is 65 % female and 27 % are either married or live common-law.

The Survey

While my research is qualitative in approach, since much of the research examines computer ownership rates and their effect on learning in the current environment, it was necessary to gather some quantitative data to compare ownership rates among a population of financially disadvantaged adults and the "regular" Canadian population. I developed a brief survey that explored the theme of access through ownership or social networks, future academic plans and recipient status through the student finance board. It was my intention to gather some preliminary data that would provide data for comparison and to provide some guidance in the development of an interview guide.

I was given permission to survey two Information Processing classes at the institution. While this course is not mandatory for students, over 80 % of the students in the academic upgrading program take the course in either in the first or second year of their studies. The director of the department felt strongly that most students who are bound for post-secondary studies take the course. The group of students that I was surveying, therefore, closely matched the characteristics of the student population I would interview. As with the interviews, I used only information of those who received student finance grants as a filter and from those who were planning post-secondary studies. From the two classes, I obtained 48 surveys, of which 45 matched my criteria for participating in the survey.

The Interviews

The same institution that granted me access to survey students also mailed my letter of solicitation to 44 graduates who had gone on to post-secondary training from the previous year. The mail out got a total of 3 responses which was not enough; I decided to go through my contacts who work in the field to get other participants. While purposive sampling poses certain problems of hypothesis guessing, a small sample size does not provide very much range for comparison purposes. My contacts were only given slight details on the study and none of the potential participants were currently involved in any kind of class or program with these contacts. Three other participants were found, two of whom were suitable for the purposes of this research. Finally, I decided to advertise and offered a small sum for remuneration. I obtained one respondent in this manner. In total, six people were interviewed for this study.

The participants were interviewed in a variety of mutually agreed upon locations: student lounges, cafeterias or their homes. I wanted to establish some rapport with the participants to minimize any cultural or educational differences. Three of the participants were men who had been disenfranchised economically and I was conscious of the discomfort that some may feel in discussing these issues with a female interviewer. I began each interview to gain some background on the participant and where they were in their studies before commencing the rest of the interview. I wanted to ensure that the same information was covered in all interviews, but also wanted the freedom to diverge to other areas with the idea that data not previously considered in my research would emerge. I used Patton's (1980) categories of interview questions to avoid dichotomous questions. Despite my efforts, I found my interview skills lacking in my beginning interviews. Later interviews were more productive. The difference in quality was to some extent alleviated by member checking. A guide allowed me to probe responses to provide clarification but ensured a certain amount of consistency throughout each interview. I used a technique of repeating or paraphrasing the participants' responses to get more detail on the response without leading the participant. I was granted permission to tape record the interviews of four of the participants. Two participants, both second language speakers of English, refused; I tape-recorded my own memories of the interviews immediately after talking to both participants. I took copious notes at all interviews to assist me with my probes.

The Participants

Jack is a thirty-four year old former autobody mechanic who is married with two children aged six and nine. He was successfully and happily employed in this line of work

from the age of sixteen as an apprentice to age thirty as a self-employed tradesman. He and his wife had already paid off their house mortgage. At about age thirty, he started to notice a deterioration in his health and found he had suffered some neurological damage due to exposure to noxious substances in his work environment. He decided that he had to make a change in his line of work immediately. He sold his business and tried to start a delivery business, but was unsuccessful in this venture. During this time, he and his family lived for two years off his wife's modest income as a waitress and the family savings before she lost her job. Jack finally decided that more education was necessary. He chose to enroll in an institution that allowed him to fast-track through his high school diploma in one year, which he did on a student finance grant. He then went to a private school to get certification as a systems analyst. I interviewed him shortly after he had finished his studies. When I spoke to him a second time to do member checking, he had just obtained a three month contract in his new field with a local employer.

Jessica is a 29 year old new Canadian from Vietnam who has lived in Alberta for the past seven years. Her older brother and father had emigrated first and saved up the money necessary to sponsor Jessica, her sister and mother to Canada. Upon arrival in Canada, Jessica benefited from ESL classes and then went to work with her mother and sister at a local food manufacturer. She and her sister continued part-time classes to improve their English. When the plant was downsized, Jessica decided to get her Canadian high school diploma and spent two years at a local upgrading institute. She graduated with top marks from this program and then went to a local technical institute to study computer

programming. When I met her, she was in the second semester of a two year program. When I talked to her again, she was still in the program and about to start her second year.

Teresa is a 33 year old housewife originally from Hong Kong with two children aged nine and ten. She and her husband emigrated to Canada 10 years ago. They originally got work managing a motel in a rural part of British Columbia, however, they felt quite isolated there and decided to move to Alberta for better work opportunities. Her husband got work as an apprentice machinist at the shop of some people they had known in Hong Kong. Teresa continued to raise the family for the next two years until her youngest son was six. She then enrolled in a local upgrading institute to get a Canadian high school diploma. From there, she enrolled at a local technical institute in teller training. When I first spoke to her, she had just graduated from her one year program. When I spoke to her again after four months, she was still looking for work.

Albert is a forty-eight year old man who is the custodial parent of a nine year old son. He also has a twenty-four year old daughter from another relationship and a grandchild. His daughter was in an upgrading program when Albert decided that it was now a good time to try to finish his schooling. His previous employment as a truck driver was no longer possible due to an impaired driving charge. Also, custody of a young son and a work-related injury made a return to other types of employment that Albert had engaged in impossible. He completed his upgrading course in one year and applied to a local community college in the social work program. His application was turned down because he had not demonstrated a sufficient length of time of sobriety. He then applied for short-term training as a Life Skills Coach and completed this training at a private post-

secondary vocational institute. When I interviewed him, he had just finished his course and during my second contact with him, he was employed in a group home.

Steve is a forty-three year old divorced father of a twelve year old boy. He had previously been employed as a journeyman cook, however, a foot injury made the return to this line of work impossible. He then tried working in the human services field in Northern Alberta. He was successful in getting grants to run job preparation programs for local aboriginal youth and was employed doing this for a number of years. When social service cutbacks made the qualifications required to submit proposals more stringent, Steve decided to go back to school in his local northern community and finish his high school diploma. He then enrolled in an engineering design and drafting course in southern Alberta where he completed one year of his program. When I first spoke to Steve, he had been working for an employer in Northern Alberta for the past year. When I next spoke to him, he was on a temporary lay-off and looking at entrepreneurial work via the internet.

Mary is a 44 year old single mother of a seventeen year old girl who has severe health problems. Mary has been on social assistance since the birth of her daughter and has difficulty getting regular support payments from the girl's father. Mary was ordered by social services to enroll in an upgrading and job preparation course where she successfully completed her high school diploma. She was not successful in getting work and felt that the administrators at the company were unsympathetic to her need to be available for her daughter. Mary was subsequently cut off social assistance and has been living on charity for the past two years. She has subsidized housing at an inexpensive rate and has developed a network of support from a local grocer, who supplies her with day old bread

and some produce, and local churches where she and her daughter go to eat. Mary tries to rotate where she goes for charity as she does not want to wear out her welcome. She has also found sporadic employment doing bookkeeping at local charities. Mary has enrolled, through the student finance board, in a computerized accounting program at a local community college. Mary presents herself as an enthusiastic, intelligent and articulate woman, however, her appearance, marred by a missing front tooth, is most likely a significant deterrent to finding work.

Data Analysis and Establishing Trustworthiness

The use of a survey and interviews provides a certain amount of triangulation of the data. The survey confirmed themes from the literature review and gave preliminary data that were useful to explore further in my interviews. I began my data analysis during the data collection stage through quick profiles of each interview. Miles and Huberman (1994, p. 51) recommend the use of a "Contact Summary Sheet" to summarize the main points of an interview, the impression left with the interviewer and to provide focus for subsequent interviews. I began transcribing before all interviews were completed and began some of the coding during this time frame. Although this research does not use an inductive approach, I found Strauss and Corbin's (1990) description of open coding to be invaluable for thinking about the concepts and categories in a deeper way. I was able to discuss these concepts with a fellow graduate student in informal debriefing sessions. Additional questions arose during this process which I tracked and posed back to the participants for clarification after the initial round of interviews through member checks. I found the participants that I interviewed were very different in their circumstances and

correspondingly in their views and needs. I developed a matrix modelled after Miles and Huberman's "Case-Ordered Effects" (1994) to allow for visual representation of the data in a coherent and concise way and also to look at divergent data. By the time I reached this stage, I was living in a community well away from the area where I had done my data collection. The matrix helped me in my discussion with a work colleague with whom I could share my results and test my conclusions. The time and expertise of this individual did not allow for a formal audit trail as described by Guba and Lincoln (1985), however, her opinions on my summary notes, transcriptions and written conclusions provided the basis for feedback and discussion in a modified version of this process.

Limitations and Delimitations

Qualitative research details the perceptions and experiences of a small group of respondents; it cannot be generalized across contexts. Rich descriptive information of context and respondent will allow the reader to determine the applicability of the research to other contexts and other participants. I initially thought that applicability would be a major limitation for this study. Other than their eligibility for student finance grants, the participants varied greatly in their circumstances and were pursuing different goals in terms of their post-secondary studies. As will be demonstrated in Chapter Four, the broad range of individual backgrounds became a strength in drawing conclusions around several themes; where individual participants differed greatly, their divergence became the outlier data against which the validity of some of my conclusions could be tested.

Another concern with respect to applicability is the rapidly changing nature of technology within society. The subject matter of this research is highly dependent on the

time period when the research was conducted. I was concerned that my study had limited transferability beyond the time frame during which it was studied and written. Guba and Lincoln (1985), however, dispute the notion of time and context bound generalizations with the view that all generalizations alter over time. While computer rates are increasing dramatically, the introduction of new, more advanced technology may continue to create a gap between the technology "have's" and "have nots." Therefore, access to the most current technology for the financially disadvantaged learners may continue to be a similar, although not identical issue.

Still another limitation of this study is its use of volunteers. This tends to bring in people who have had particularly good or bad experiences with respect to the phenomena. In the case of this research, many, although not all, participants were particularly interested in technology as a field, and thus, were atypical of many adult students in this group. The volunteers for my survey were, in two cases, interested in volunteering because of the focus on technology. As the number of people who did volunteer was insufficient for my goals in the research, I switched to recruitment for three additional volunteers through my contacts in the field. Recruitment through volunteers or purposive sampling poses the threat of hypothesis guessing. This method affects the credibility of the study as respondents, no doubt, had predetermined ideas of what I, as the researcher, may have been looking for from the form of contact or from the interview itself. The limitations imposed by purposive sampling in this study are arguably minimal due to the nature of my recruitment; my contacts put me in touch with clients who had undertaken post-secondary training regardless of the area of study.

The use of provincial grant recipients as an accessible group to represent a target population of financially disadvantaged adult students proved to be a double edged sword. Eligibility for the grants provided a convenient and officially recognized benchmark for an educational environment in this province. The use of grant recipients, however, excluded those who did not qualify for the study, but may be financially disadvantaged with other measures. The other problem in defining the population in this manner is eligibility for provincial grants requires a certain degree of stability on the part of the applicant. A severe or prolonged state of low income, however, is obviously associated with challenges in fulfilling and maintaining basic needs. Descriptions of the interview participants for this research will show that most had sufficient resources to belong to an "upper bracket" of the disadvantaged.

The credibility of the study was somewhat hindered by the interview method itself as I revised my focus in the interview process from interview to interview and also became more skilled as an interviewer. Member checking minimized this threat to a great degree as I was able to clarify points not developed in my initial interviews. Finally, the diverse backgrounds of the participants and the "multiple constructions" (Guba and Lincon, 1985; p. 296) they offered also strengthened some of the preconceived ideas I held prior to data collection but contradicted many others. These divergent views allowed for the emergence of new ideas.

This study has the following delimitations:

1. Only six students were interviewed for this study.

2. Data for the survey portion of the interview was collected from students at only one institution.

3. Methods have been confined to a brief survey and to a semi-structured interview format.

CHAPTER FOUR

RESULTS AND DISCUSSION

This chapter has been divided into two sections: the first will be a brief discussion of the results of the preliminary survey; the second will describe results of the interview. Each section will be divided according to themes headed by subheadings to guide the reader. Each subheading consists of a direct quote taken from one of the participants. Following the quote is an explanation of the context from which the quote was taken. Using the quotes from the participants allows their voice to guide the reader through the discussion.

"I'm too poor": The Survey

The most recently available statistics from Canadian sources (Statistics Canada. 1998) show that only 45 % of Canadian households own a computer. This statistic was an increase of over 5 % from the previous year's statistic. Modems showed a similar increase with 32 % currently, up from the previous year's 25 %. Internet use, which may or may not denote access, also showed a similar increase with 25 %, up over 17 %. Consistent with the literature on American computer ownership and family income, Canadian data show that computer ownership correlated with income (Statistics Canada, 1999).

The results of my survey are displayed in percentages:

Questions	Yes	No
1. Do you own a computer? (If yes, skip to question #4)	42.2%	57.8%
2. Do you have access to a computer through family, friends or work?	36.4%	63.6%
3. Do you plan to buy a computer within the next 12 months?	20.0%	80.0%
4. Whether you own your own computer or use one through friends, family or work, do you have internet access on the computer you use?	38.6%	61.4%

Table 5-1

When I tallied the results of my survey, I found that the group I had surveyed had similar ownership rates to the general Canadian population at 42 %. This compares favourably with the general Canadian population. There may be a number of reasons for this and this will be examined in greater depth in the analysis of the interview data. First, the statistics from Statistics Canada are taken from data collection in the previous year. As discussed above, computer ownership rates are increasing yearly and so the lag between national data and this research makes comparison difficult. If we can assume that current computer ownership rates in the general population for 1999 have most likely increased, then ownership rates amongst this group is behind. This group is entirely made up of students who are planning to continue on to post-secondary studies. As a group, they may place a higher priority on obtaining a computer than many financially disadvantaged adults. Finally, without a clear picture of what kind of equipment the students have, it is difficult to say whether the access they have makes functioning in a technology dependent environment feasible. The usefulness of computer ownership data may no longer be a

useful indicator of access as the needs of the environment change. The implications of future plans and quality of access will be discussed in more depth in the interview analysis.

The question regarding access through friends, family or work also gives some preliminary data to examine in the interviews. Of the students who did not own computers, a significant number, 63 %, had virtually no access. In light of the literature review, this makes this group particularly limited in terms of gaining confidence, skills and general exposure to technology. An even higher number of the non-computer owner group had no plans to purchase one in the near future. One participant noted in a side comment to the question on purchase plans, "I'm too poor." The interview analysis will examine in more detail what it means to lack exposure and access in post-secondary environments in more depth.

"Easy to Find a Job": Connections between Technology and Financial Security

The circumstances that caused the six interview participants to be financially disadvantaged are as diverse as the individuals themselves and cover what other researchers studying in the field have frequently noted in their studies: health and disability, immigration, divorce and single parenthood, economic downsizing, discrimination, alcoholism or a combination of such factors. Both Jack and Steve had, in fact, enjoyed a middle class existence prior to their difficulties. Theresa's life, prior to emigrating, was also middle-class as a native of Hong Kong. She differed from the other immigrant in the group, Jessica, who endured a much lower standard of living in Vietnam than do many economically disadvantaged people in Canada. Mary and Albert were at the other extreme of this continuum; Mary had been on social assistance for fourteen years

until being cut off. All participants, however, found it difficult to improve their financial situations once adversity struck. A lack of education, and in the case of the immigrant participants, language skills, made it difficult to remain afloat financially in the changing economic environment. The necessity to upgrade and obtain increased certification could even be felt in an isolated community where Steve had been earning a living conducting retraining groups of Native youth:

> I made the decision to go back to school because I had a very weak academic background and I felt that I had to upgrade myself to stay in the job market....I was employed as a contracted employee for various government agencies and when the cuts came, I didn't feel very competitive with other employees to gain contracts...the job market became very competitive and I had the much of the skills but not the qualifications to get anything.
>
> I went to talk to people in the Social Service field and was told that probably to become employable again, realistically employable, I would probably have to go to a community college and take a two year program.....My source of income just died.

Many of the participants saw technology as a solution to their difficulties. Prior to enrolling in his post-secondary studies, Steve's employment varied from the trades to the human services field. The decision to pursue post-secondary studies brought a focus on technology. When asked why he had enrolled in Engineering design and drafting, Steve replied, "...the literacy of technology would improve my opportunities for employment."

The focus on computers as a panacea to economic ills was a recurrent theme. Jessica was studying computer science because "...The computer field is easy to find a job." Jack felt it was important to get back to the financial position he had enjoyed prior to the deterioration of his health:

> I knew the computer field was expanding and I had done a lot of research ...and it was growing and it was going to grow more and I figured there would be some job security down the road as well as a decent wage....I wanted to be able to replace the money I made prior to going to school. And I think I will.

Not all participants were focussed on financial security. Theresa, a housewife for many years, was interested in part-time employment and would focus on full-time work when her children were older. Albert's decision to upgrade was prompted by an impaired driving charge and the loss of his driving licence for three years. "I thought well, I've got these three years to change my life in, I'll do something with it."

Theresa's and Albert's interviews diverge from the other four because finances were not the main issues for these participants. Theresa states. "My husband can worry about money." Their educational and occupational goals are also not focussed on technology. The other participants, worried about job security and money, have a definite interest in technology and see it as the answer to their economic woes. Shanahan (1997) observes that this focus on technology for the unemployed is the result of repeated and unquestioned warnings that a failure to be technically literate will doom one to perpetual disadvantage. What is striking with this group of participants is that of the four who were motivated to upgrade for financial security reasons, three of them have embarked on careers which can only be viewed as highly technical and a virtual departure from their previous work. So the social worker becomes an engineering technologist, the autobody man becomes a system analyst and the assembly-line worker, a computer programmer. Even for Mary, whose training in computerized accounting updated her previous career in

bookkeeping, the solution to her poverty lay in technology. She states she enrolled in her program, "...to get my technology and train whatever in the 90s to just upgrade - or update it." It would seem that these participants have embraced what Robins and Webster (1989) predicted would be the widespread belief in technology's solution to unemployment.

"Everyone in this program is required to have a PC": Computer Access Issues

Not surprisingly, the participants who were not computer owners at the beginning of their academic upgrading program placed a high priority on becoming owners. Only Jack had owned a functional computer prior to upgrading. None of the participants purchased one during their upgrading program, however, Jessica and Theresa purchased systems before starting their post-secondary studies. Jessica had fortunately won a one-thousand dollar scholarship which enabled her purchase. When asked what she would have done without the scholarship, she said it would have set her back a few months, however, she still would have saved towards a computer; she had been methodically saving for a number of years as part of a long-range goal to work in the computer field. When asked about program requirements, Jessica was initially adamant that "....everyone is required to have a PC in this program..." When questioned further, she explained that her institution had no such requirement, however, the demands of the program and the availability of labs at the institution made ownership a necessity. The institution used its labs for extension programming and students only had three to four hours daily when these were available before the building closed. Jessica estimated her own computer use outside class at five hours daily. Although Jessica purchased a computer, she was somewhat dismayed that she

would need additional software for her program such as SQL. Her tight budget did not allow this luxury, so she found herself partially dependent on the institutions labs. Her schedule found her on some days waiting for the last class held in the appropriate lab to end at 4:15 p.m. where she would work until extension students came at 6:15. From time to time, her assignments required her to wait until these students were done at 9:30, and she would slip into the lab at that time until closing time at 11:00.

Steve tried to manage his studies without a home computer in a program that he described as "...one hundred percent computer based." He "...lucked out..." and got a place to live near the institution where he was studying. Like Jessica's situation, the institution where Steve was studying used the labs for instruction and students had to schedule their time around the lab's availability. The labs stayed open until three in the morning. Steve found that the late nights were often not enough. "We worked until 3:00 at night and then there were times that I'd actually sneak in until later...sometimes I'd stay up all night to do it. Like I said, I was really behind." Steve negotiated access with lab proctors who would relax the rules around exam times and stressed, "....and I wasn't the only student doing that."

While Steve was able to stay late, Mary was a nervous single parent of an adolescent girl with health problems whom she was reluctant to leave alone at night. The institution she studied at had a system of reserving computer times in their labs and in their library. Mary found exam times particularly stressful:

> You know, you couldn't go during exam time because you couldn't get near the computers. You could only go before

> and after exams, so you can get the time and get your practice in.

Her strategy for dealing with the overcrowding was to be persistently vigilant. When asked how she managed to get her time in on a computer, she replied:

> Just keep going back and just watching for a computer: 'Oh, well, they haven't showed up yet? Okay, well, can I, you know, have just half an hour?' "Okay, well, this person will be back.' "Okay, fine. Can I have that time until they get here?'

Mary tried other solutions: she visited other institutions to access their labs, as well as provincial Career Development centres and the local library to get the practice she needed to learn the required skills for her course. Her efforts left her discouraged, but creative:

> And I just gave up after a while because it just took too much time to stand around and wait or try and find, you know, something open. ...and if I happened to be there and there was something open, I'd carry some of my stuff with me and just stop in there and practice. Or...one of the government offices, just walked in there. If they didn't need the computer - a politician's office, they allowed me to use their computer to practice on for a little bit.

<u>"Find the Cheapest one I can get": Purchasing Technology</u>

Theresa purchased a computer "to go to school." Although her motivation behind buying the computer was for the convenience, later in the interview, she stated that she bought the computer "for the kids" and because her husband wanted the internet. Clearly, the needs of the entire family were part of the decision to purchase one; Theresa's school work became the final reason to make the purchase. Her program had scheduled lab hours

and Theresa found class time more than adequate in which to complete much of her assignments.

Like Theresa, Albert's program was not focussed on technology, but he felt that there were enough reports and essays to warrant the purchase. He considered the labs to "...be a hindrance.." because he was a parent. The purchase was important for him, but also for his school-aged son to access information. He was shopping for a used computer and estimated that he could get a basic model for around five hundred dollars. He did not consider the expense unreasonable or one that would deter him from his studies.

According to the results from the initial survey done for this research and the interviews with the participants, computer access for the disadvantaged lags behind the general population but appears to be increasing and may, in a few years, match the access rates of the telephone. This confirms the view of those who subscribe to Sargent and Tucker's (1997) theory that technology will increase rapidly and be almost as pervasive as other modern conveniences. A few factors may affect the complete proliferation of the computer. In this study, a partial motivation for custodial parents to purchase a computer was to fill the educational needs of children. Another factor was engaging in post-secondary as opposed to upgrading education; none of the participants in this study expressed the need to have a computer during their academic upgrading program and none purchased one during this period; however, they all considered it crucial to success in their post-secondary studies regardless of their area of study. It can be assumed that for financially disadvantaged adults who are either non-parents or non-students, computer ownership continues to lag substantially behind the general population.

Many disadvantaged students are able to afford the expense and have strategies to purchase one, such as Albert who reported,

> I'm going to see if I can buy a used one...I was in Radio Shack the other day and they have a basic model for $1100 and so I figure for a used one, you should be able to get one for half that. ...I'll start with used computer stores. I know some places rebuild now. So I'll start there and work my way.. Find the cheapest one I can get with all the stuff I need on it.

While buying a used computer may fill the needs of students in low technology dependent environments, there are obvious limits as to how used a computer can be to be functional. Mary's daughter had a fourteen year old computer, which she got for babysitting in lieu of cash payment. Technically, Mary is a computer owner, however, the age of the machine made it useless for even the most basic tasks. Computer ownership is no longer a convenient variable to measure without taking into account functionality such as an ability to load current programs or access the internet. Another concern for Mary was the fact that her daughter had to ask friends for the use of their machines in order to complete her assignments.

Other strategies for access among the financially disadvantaged was the black market. Steve states:

> If you're alive at all, you can at least walk up to try one computer experience. I got bootlegged programs. That's a $3,500 program and normally the guy would probably sell it for a hundred. Can this really be structured? I mean, I think the best thing they could do is give people a chance with it...at least be honest about it because the price of computers is coming down...for about $600 or $700, you can get Windows 98 for 8 MB...probably a shitty monitor,

> but this is really, really good stock for people on the underground economies.

From this underground, Steve managed to assemble what he described as a "junk computer" Functionality of this computer was still an issue for Steve, who, after he finished his first year of studies, moved in with his parents in his home community in Northern Alberta. The lack of functionality of this system made it difficult for him to take on small design jobs. He was fortunate to find sporadic employment with a local employer. The "junk computer" still serves a useful purpose for Steve in educating his father and mother about the computer and creating a ripple effect in terms of access and literacy.

Mention has been made to have student buy/lease plans for the general student population (Resmer, Oblinger and Mingle, 1995). I would question whether this is a wise use of resources; it would seem that a better solution would be to negotiate better academic prices on software or limiting a Student Buy or Lease plan for financially disadvantaged single parents. Sufficient institutional lab access for non-parents who cannot afford a computer would suffice in most cases; for disadvantaged students who cannot afford the purchase, lab use is difficult, but adequate. It is clear, however, that not having a computer in a technology intensive program is an extreme disadvantage and certain programs may have to make additional accommodations for financially disadvantaged students enrolled in these programs.

"Wear out my Welcome": Access through Family or Friends

Participants who didn't own computers were asked about arrangements for access that they could make with friends or relatives. Only Mary had attempted such an arrangement with her friends, but was very careful not "to wear out [her] welcome."

> They have computers, but their husbands or boyfriends or whatever don't want other people using them. It's theirs...You put a lot of money into buying a computer, and you don't want the community coming in and using it.

Mary lived in a low income subsidized housing complex where she confirmed that many did not own computers. In a subcommunity where a commodity is less accessible, one could easily see that time on the few computers would be in demand and computer owners could become willing or unwilling hosts to the community. Many of these "hosts" were those who had embarked on post-secondary training. The hosts' experiences are, no doubt, interesting ones from the point of view of non-formal education and the domino effect of adult education.

Steve was new to the community where he was studying and his only friends in the program were non-computer owners as well. His heavy and late night use of the labs probably ensured that his social network were as dependent as he was on labs. Albert's friend assisted him in transporting a computer to his home; he had fortunately negotiated a computer loan plan financed through the Workers Compensation Board. This allowed the institution where he was studying to loan him a computer during the period of the course. He arranged for a friend to drive him home with the computer and plugged it in.

The computer had already been set up so no additional knowledge or installation was required.

The "Computer Wizards": The role of One's Social Group in Obtaining Access and Literacy

What was more interesting was the role that the participants' social network played in ensuring that the participants had access in a broader sense. Jack's brother-in-law had rebuilt the motherboard on an old computer of Jack's. Jack ended up selling it to his father who was interested in getting online. In this family, computers have become the mechanism of male bonding. Saturday afternoons working over an engine discussing brake jobs and tune-ups have been replaced by discussions on upgrading RAM and modem speed. Jack referred to this activity as "the thing we end up talking about, which pisses off my wife."

Participants who were less computer focussed also relied on friends to help them "connect." When Theresa and her husband purchased a computer, it was a friend, also a Hong Kong immigrant, who advised them on the purchase and set the system up for them. Albert, in his shopping expedition for his eventual computer purchase was planning to "draw in the computer wizards to help (me) choose one." When asked who the "wizards" were, they were friends who had computers, spent a lot of time working with them, usually as a hobby, sometimes through courses, and were willing to share this knowledge.

Non-computer owners in technology dependent programs without a social network had more difficulties. Jessica observed that at the beginning of her program, many students had more general and even specific computer skills, which she did not feel that

she had. In her academic upgrading program, she had been trained on a Mac; she had never used a Windows operating system. No one at her home knew how to use Windows or do any other programming and she said that other students seemed to know a great deal more than she. When I asked her how she thought they had gained their skills, she guessed they learned from parents, friends or perhaps from high school. When asked how she coped with not knowing as much, she said, "Nothing. I just work harder."

Steve's lack of a social network made the completion of certain assignments difficult. His institution was located in an area where many of the residents belong to a religious group. The program that he was in was extremely difficult and, out of forty-five students at the beginning of the program, only six completed it in the scheduled two years. Steve joked, "You have to cheat to win." When I asked him to clarify this remark, he talked about the team work that was emphasized in the program and the need to work with the best students in order to complete the assignments satisfactorily. If students did not have this advantage, they were more likely to receive much lower marks or have a more difficult time completing assignments:

> Well, without the team work aspect, a stronger team work aspect. That's another thing. [There's] a very strong set of [religion] thing there..." I'm out. I'm not [from this religion]. I'm from Northern Alberta. I'm just a wild man with very little status in the classroom and it's really hard to gain that very, very quickly in school.

Steve also saw technology as providing emotional support for students while they are studying. He did not have access to email and was unaware of web-based email. He

reported, "My son has email and I can't talk to him because I'm too damn poor." In Steve's work with Aboriginal people, he observed,

> I think Native people should be able to communicate with their family ...[It] probably would go a long ways to enabling them to finish their programs...The family thing, that's the most important thing. Well, if they can't talk to them...they no longer feel that's a big value for them. Can you imagine how much a native person would feel? Imagine you come to some place with $5. What do you do? You can't feed your kids, whatever. You can get welfare and yeah, you go to Bingo because that's where other native people are...that's where you get the chance to see maybe your uncles or relatives or somebody....

"Just Like a Loser!": Literacy levels, Status and Computer Ownership

Participants' comfort level at the beginning of their post-secondary studies revolved around two variables: computer ownership and the level of technology use in their chosen field of study. Jack had owned several computers through the years; as mentioned above, members of his family were computer owners and had a good degree of shared technical expertise. When asked to compare his level of computer literacy with the other students, he saw himself on par. "[We were] all pretty much the same. I mean, say out of twenty-three students, there might have been a few with a little more knowledge and two that had never touched a computer."

Theresa's bank teller training did not place any excessive demands on her in terms of her prior knowledge. "We weren't focussed on the computer." Theresa felt her preparation at her upgrading program gave her the skills needed to complete the assignments in this program to a satisfactory level. "If you didn't take computers before, you just had to work harder." The academic upgrading program provided computer

literacy courses on MacIntosh computers rather than on PC's. At the beginning of her program, Theresa found that all labs were equipped with PC's so she spent a couple of evenings with a friend who had Windows 3.1 to learn the basics. She found she had no problems switching to Windows 95. Likewise, Albert reported feeling confident with his computer skills; as his Life Skills program required only word processing of reports, he felt his preparation in his academic upgrading program was sufficient.

Theresa's comments about working harder are similar to Jessica's reaction to coping skills. Their outlook may or may not be the result of similar cultural attitudes. Their words, however, emphasize that, whatever the inequities in the system, it is the individual's actions which are part of the solution.

Jessica, as a new computer owner beginning a computer programming course, felt overwhelmed by the differences between her level of literacy and that of the other students in the program. Like Theresa, Jessica's academic upgrading program consisted of computer literacy courses on a MacIntosh platform. Lacking the same network of computer literate friends, Jessica found switching to PC's to be very difficult. When asked how her skills at the beginning of the course measured up to the other students, Jessica said she felt "just like a loser." Jessica felt awkward and embarrassed having to have procedures like double-clicking explained to her. She also observed, in addition to general comfort with the computer, the other students appeared to have a great deal of specific knowledge about programming, knowledge that she thought came from family, friends or high school.

Another incident in which she again mentioned this phrase, "just like a loser," was her experience with a computer basics class offered in the first semester by the computer systems program for students such as Jessica who were missing the basics. On the first day of class, the instructor said that the class was optional and only for those who had gaps in terms of Windows and basic concepts of the computer. The next class, much to Jessica's surprise, she was the only one who came to class. She felt behind because she was the only one who required the help. Later on in the semester, other students started attending the class as their deficiencies started affecting their work. By the end of the semester, about ten of the thirty people enrolled attended regularly. Much of Jessica's discomfort may have been from her overall seriousness in pursuing her program and not through substantial disadvantage. A discussion on institutional practices will be dealt with later on in the paper.

The term "loser" is an interesting one because Jessica has everything to gain: an education, skills and employment in the future. Her sense of loss was initially in not being equal to the other students and therefore, in being disqualified from further scholarships, the best job offers and further education at the university level. The first two provide financial rewards while the third provides important status for Jessica.

Status was important in a different way to Mary. When asked why she would like to buy a computer, she stated,

> ...just being comparable, because, say, you don't own a CD player, and like, I don't have cable or anything, ...you're almost seen as you're not keeping up with the times and you're not staying-you know, it's 1999; why haven't you

> got this? And people ask me. "Well, why don't you have a computer?" "Well, I don't have the money to buy one."

It is difficult, given the circumstances of Mary's life, to understand the importance placed on having a computer. She saw it as similar to having a phone or a basic need. Sarlo (1992) would no doubt classify this as a social need or the result of pressure to conform. Yet Mary's yearly income would put her safely in Sarlo's definition of absolute poverty. She had little to eat and depended on soup kitchens. Mary's need to be included, whether socially motivated or not, was strong. Realistically or not, Mary viewed her own poverty as partially caused by her "have not" status. She related the following incident during her job hunt:

> I would like to [purchase a computer] very much...just to keep up with everyone else, to keep - just to stay on top, because you can't use a typewriter; most documents are not acceptable even if you type it up really nice - I went to one city department, and I had a hand written letter, and the person there said, "Well, why don't you sit down and use our computer and do it up nicely."

Steve stated that having one's own computer was important for exposure needed for basic competency. He related a lack of ownership to lack of skills and its impact on one's skill level and employability. He observed many graduates in his discipline find work at small firms with employers who are not very technically literate.

> Having your own [computer] is really where it's at. First of all, the computers at the college are not free standing computers. They're in a network so you don't face the same problems as you do when you have a free standing computer, especially after you graduate when the boss you have basically knows how to turn it on and type his name, and he expects that you know everything about computers...If you had a problem with your computer at the

> college, you page your proctor in and they take care of the problem for you. If you have a problem in the office, you've got to develop your own resources real fast.

He was asked to clarify what problems he had encountered, he compared the networked post-secondary environment to a work environment and gave this example:

> An example of this for instance...if you get a non system disk error, that's a very confusing message in the first place. You don't get that on the college computers...So then you go the boss' computer and you get non system disk error. Well, now it's time to call the technician. Great! He's not going to be very happy to get a $40 bill to tell you that your disk is in and you need to take it out. It's a very simplistic example, but those are sort of some of the things that you figure out if you had a computer at home and you've watched it and you've jammed it up and you've crashed it and you couldn't start it up....At least you have the experience of calling your support talking to somebody else who had the computer... who had a non system disk error because it's a simple problem that you solve. But to go on the job site and to not be able to do that, you look pretty incompetent. It makes like you don't know much about computers.

"On Par": Literacy levels of Participants After Post-Secondary Studies

While non or new computer owners in technology dependent environments saw themselves as lacking skills at the beginning of their program, that was not necessarily their self-assessment by the mid-point of their program. Jessica observed that, while many of her fellow students seemed to know a great deal, many of them "did not get the highest marks." Jessica may have been experiencing what Levine and Donista-Schmidt (1997) observed in their study, namely, confidence due to exposure had a negative effect on learning more. By the time of our initial interview, Jessica felt that her computer skills were comparable to those of her fellow students.

Steve described himself as disadvantaged in computer literacy compared to fellow students. Luckily, he was able to get course related employment where he was able to get the exposure that post-secondary training and extended lab hours were unable to provide. He stated, "I moved into the office so that I could get confidence." The extra hours working with the computer gave him the experiential training that is difficult to acquire in a school based setting.

In contrast to Jessica and Steve, Mary's skills decreased compared to her fellow students. She had previously gained computer skills in her upgrading course and described herself as someone who liked technology and found it easier than others. She saw her skills as equivalent and even better than other students at the beginning of her course. Her situation quickly changed:

> I started out with intro courses, and yes, they [my skills] were on par with the intros. But when I started getting into the intermediate and the advanced courses and the programming, no. I was losing out. ...I was not up with the others.

Mary linked this "losing out" because of access and went on to explain the difference between her skills and the skills of the others:

> Because they [the other students] had big systems at work or they were computer programmers in training. They had computers at home; they were computer hackers. You know, they eat, breathe, and live computers; you know, they carry computers with them and whatever....A lot were employed...when you're not employed and you're not exposed to it at work...even though you can keep up with them, their basic general knowledge, just every day stuff, is so much faster.

Mary felt shut out. She needed the exposure to get the work experience skills but was unable to get work to get the skills. Mary's experience is similar to observed phenomena reported in general literacy studies (Malicky, Dieleman, Wong, and Krahn, 1998). A person needs to be in an environment where literacy skills can be practised and expanded upon. Mary seemed quite aware of her quandary but saw no solution. Comparing Mary to the other participants, we see the problem that non-ownership without reliable access imposes. Mary was the only participant in a highly technologically intensive program without home computer ownership or access through work. While a basic level of expertise is obtainable, an advanced level is difficult to obtain and solidify.

Several contradictions arose with non or recent computer owners in terms of their real and perceived computer literacy at the time of the interview, which occurred either 6 months into their program, or within 6 months of finishing. Steve, Theresa, Jessica, Mary and Albert, who were all non or recent computer owners, all felt that their current computer literacy skills were adequate for the goals they were pursuing, and usually comparable to their classmates. However, their interviews revealed gaps in their basic knowledge. Steve, for example, expressed great interest in the use of Email and the Internet to increase one's economic opportunities as well as its power to keep people connected to their families and communities. He was unaware, however, of Web based email as a means to communicate with his own son. He knew about HTML, however, he did not know how to create web pages using either HTML or text editors. As one of his goals is to diversify and advertise his services to other engineering firms or individual clients, this would be a very important skill for him to obtain and, as of our subsequent

interview, he was planning to take a course in web page design. Jessica also wanted to learn web page design, but was planning to learn the skill on her own. Mary, despite an intermediate to advanced background in accounting and accounting software misused the term "downloading" programs; she thought to download a program would delete it entirely. Albert searched the Internet for web sites that would give him information on scholarships and bursaries that he could use to further his education. He related the following experience:

> I got on [online] and I couldn't find ...the net location for the ones I wanted ...all I could keep coming up with on the net were American scholarships and I was told that there were Canadian scholarships on the Network. I was there two or three times for two or three hours and I couldn't find them. After two or three days I gave up.

Theresa had a similarly frustrating classroom assignment where she could not find information on local employment resources. Three months after our initial interview, Theresa was still sporadically job hunting with little success. She lacked knowledge on using the internet to gather information on organizations she might want to contact and on the impact that technology has on the industry in which she wants to work.

The deficiencies in basic computer literacy that each of these participants revealed have differences and a commonality as well. Steve and Jessica's lack of ability with web design is from a lack of opportunity in their programs, while Steve's not knowing about web based email is from a lack of information. Mary's confusion over a basic term is from a lack of experience with programs, which one usually gains from ownership. The experience of "downloading" a program would make the term meaningful and

comprehensible. Albert's and Theresa's problem is one with skill. Their experience with search engines would not give either the advantage of searching by domain or narrowing the query with Boolean logic or search techniques. The commonality of these deficiencies comes from a lack of knowledge shared with others who could correct, inform and act as a resource.

"The Tricks": Minimizing Literacy Gaps

Access to computers is an issue that most participants resolved to some degree at the beginning of their programs or had feasible plans to resolve. Computer skills were a different issue as Steve pointed out, "In terms of computers being common, the knowledge is still uncommon." All participants, with the exception of Jack, the long-time computer owner, identified weaknesses in their computer literacy which were either ongoing or experienced at various points at the beginning of their program. Some of the weaknesses they identified are listed below:

General Knowledge:	How a computer works; how to buy a computer, terminology
Trouble-Shooting:	Causes and solutions for common problems such as operating system errors, freezing
File Management:	Formatting disks; creating and organizing folders
General Procedures:	Uploading files; installing or removing programs
Windows:	Procedures on Windows operating systems
Email:	Attaching files, distribution lists
Internet:	Searching techniques, Advanced search techniques
Applications:	Higher levels of word processing, spreadsheets, database skills
Programming:	C+ (Only Jessica identified this as a need)

The participants had a variety of ways to overcome or minimize their weaknesses which matched their needs and, to some degree, their personal circumstances. Jessica lacked a network of friends and family that could help her out with gaining her computer skills. Her English was difficult to understand and probably impeded the development of some relationships with fellow students who could assist her. She was extremely goal directed. She had known for a few years she would become a computer programmer; this goal allowed her to put a strict savings plan into effect. She was also very methodical in planning her time around her limited access. Prior to her computer purchase, Jessica would report at 7:00 a.m. to the library of the institution where she was studying to reserve a computer for later in the day. In her post-secondary studies, she was strategic in planning her assignments around lab availability and the software they contained. Even at home, Jessica planned her homework in conjunction with her sister, who was also a student.

Planning was not limited to time. Albert was gradually completing an informal market survey in order to purchase a computer. He started with surveying the prices and features of systems at commercial outlets, compared these with used computers advertised and then was going to consult with friends for the final purchase. Some planning was reactive in nature rather than proactive. Mary carried her "stuff" with her so a trip downtown, to the library or past a local MLA's office could be combined with her homework. Her plan was to be ready when the opportunity arose.

The plans of the above participants were consistent with the personal traits they exhibited. Mary was unquestionably the poorest. Her poverty led her to various ways to

get food and other basic needs. She exhibited the same resourcefulness in her approach to access. Jessica was more restrained and disciplined in her approach. Self-discipline and a good plan do not always work, however. Jessica found that other users who had not reserved their time would continue to use the computer, extending their use into her carefully planned allotted spot. This caused tremendous anxiety for Jessica; she thought that she would not be able to get her assignments done or, as she was depending on a scholarship, a decent mark. Jessica would approach staff to ask computer users to move but was not always assisted with this request. Eventually, repeated frustration strengthened her resolve and made her much more assertive with those who were accessing the lab computers on her time.

A primary strategy for participants to increase their computer literacy was to increase their exposure in any way they could. Mary identified computers in the community that she could access such as provincially run career centres and terminals at the local library. While both of these centres were overcrowded at times, they did allow Mary to get additional practice with the computer beyond what her institution could provide.

Mary, Steve and Jessica all tried to slip into regularly scheduled classes which were in session so they could finish assignments. Sometimes this worked well, however. Jessica felt embarrassed when she was asked to leave a class. She never attempted to use lab computers in this manner again, opting instead to reserve as much time as she could in the overcrowded library.

Mary felt ill at ease in her intermediate and advanced courses. Some instructors were aware of her dilemma; they had surveyed the class at the beginning of the course and spent more time with her or checked on her more often during class. Mary felt awkward discussing her circumstances in class. "They [the instructors] would ask me if I have a computer; and I told them, 'No, I don't have one,' and I would get looks from everybody." Other instructors were not aware of Mary's circumstances. With these instructors, Mary would position herself in the class to sit behind competent students and "watch what they were doing." This allowed her to keep pace in class and learn "the tricks," however, she felt so preoccupied copying other people that she felt she had not learned the required concepts of the lesson.

Theresa and Albert preferred to fill in their gaps through the help of friends and spent little time with institutional services. "It's just easier if you're at home," stated Theresa. Steve also felt the need for help from a technically literate friend or acquaintance to prepare for his goal in engineering, however, he had no one to depend on. He had obtained passes to spend time in the lab when he was in his academic upgrading program but found that he did not get very far through self-study:

> I just didn't have any instruction and I didn't think about buying a book ..I had very little money, I didn't think of how I could change that for myself. But I probably could have if I'd gotten a Dummy's book or something like that and got on the computer, I likely would have gained an edge. It would have been a little less tough. And I'm not saying only for literacy, that made it tough for me to go to school. There was a lot of complications. I was never really a good student. I didn't have the study skills and I didn't develop those when I returned to school.

As stated previously, Steve's network of computer literate friends was not extensive; it was not until he found work that he gained the exposure he needed. Steve found the school experience of post-secondary training to be very frustrating but work experience to be very satisfying. He stated the pivotal difference between learning in school and on the job was the experience of having a "mentor." He states:

> I have a really understanding boss and I feel very close to him personally, we definitely had similar problems. We were disadvantaged youth and he was able to turn that around for himself and I felt understood, I felt more confident, and more relaxed. He had found himself very much in a similar situation having completed one year of drafting. But spending ten years with the engineer who mentored him. Basically he felt the need to take that on with me.

This close relationship allowed Steve to "move into the office" to work on the computer and gain the experiential exposure that was lacking when he was a student.

The weaknesses that the participants identified or experienced in their post-secondary studies are very typical of what might be found in a general computer literacy course. Since all participants attended basic computer literacy courses in their academic upgrading programs, it becomes a question of whether there was a weakness in preparation of these participants, or whether the lack of access these participants experienced interfered with a complete transfer of learning of basic computer skills. The students' experiences in learning computer skills will be discussed later in this study.

Participants all had strategies to deal with the problems they faced. The success of their strategies were largely determined by the participants' own abilities to set goals and work towards them in a proactive manner and their abilities to compensate for their

deficiencies through self-directed learning and through their own network of technically literate friends, family and acquaintances. A discussion of how these weaknesses can be minimized and strategies enhanced for post-secondary bound academic upgrading students will also be covered.

"Welcome to Hell": Keeping Pace in Highly Technologically Intensive Environments

Whatever the participants' exposure to computers through ownership or other arrangements to access, students going into highly technologically focussed content areas reported being shocked at the pace and the content of their programs. Steve, Jack, Jessica and Mary reported that they, like most of their fellow students, felt pressure and stress. This study will focus on the comments they made which are traceable to the backgrounds of these participants or have a particular impact on people from financially disadvantaged backgrounds. The comments of these four participants are in stark contrast to those of Theresa and Albert; these participants reported few concerns or pressures in keeping up with fellow classmates in less technology focussed areas.

The pace in technology focussed programs was very quick and a radical departure from the preparation these participants received in their academic upgrading programs. Jack reported:

> Looking back now, when compared to when I started [my post-secondary program] to when it got really intense, I wasn't applying myself as much as I should have been. I kind of took it for granted what they told me before. They said, "This is intense." And I had been to [my academic upgrading program] and that was a condensed program and I thought that was a cake walk.

He found that he had virtually no free time and could barely keep up in his systems analyst program. The pace prompted him, when asked to be a part of an orientation presentation for new participants, to say, "Welcome to Hell."

Steve, Mary and Jessica also reported similar levels of stress. The impact on these individuals, who had far less computer exposure than Jack, was compounded because they did not have the basic computer skills required and there was little time to fill in these gaps in their programs. Steve states:

> The intro to computers was the thing. But there was a lot of assumptions within the program and people actually knew something about the computers....[Other] students take introduction to computers before they went into their college programs. So, they're already prepared - that means they have the average of what ...4 classroom hours a week to catch up on assignments and do homework, well the other students didn't have that course and took four hours out of their own thing.

Jessica also confirmed a similar experience in her computer programming course. Her lack of familiarity with the computer held her at a disadvantage in basic problem-solving and trouble-shooting. She felt the design of the program did not allow students to review basic concepts thoroughly. For students with gaps in their computer literacy, it was difficult to catch up. Theresa reiterated Steve's comments on post-secondary institutions that programs were developed and instruction conducted on the assumption that students had more prior technical skills than was, in fact, the case. "It's a good thing for me because I know the basics." Her preparation in her academic upgrading program was satisfactory for the lower technical requirements of a bank teller course.

The differences between participants' experiences at post-secondary programs that are at a high intensity and those at a lower intensity were consistent. Participants, even those who excelled in their academic upgrading programs, felt ill equipped in highly technologically intensive environments. Given the goal many financially disadvantaged adults have of retraining in the technology field and the importance with which these adult learners view technology as a panacea to financial instability, it would seem important for academic upgrading programs to develop streams or individual courses for those students bound for such environments.

"The Disparity of Education": Standards for Computer Literacy

Steve's academic upgrading preparation at a rural institute specializing in education for the disadvantaged was, he felt, very different from what other upgrading students in the engineering design and drafting program received. Most of these students went to an upgrading program which fed into the institute's regular programs:

> So I guess the common thing is the disparity of education. Like I took a course [at my upgrading institute], it was optional, not required. I took the course and it was just crap, it was nothing. There was not enough there to make it worthwhile. It gave me an idea of what computers were about, but you really couldn't do anything with it.

Steve thought the standards of the upgrading program internal to the institute where he was studying engineering were much higher. Steve also thought the differences were due to a lack of proper resources to rural areas where he had taken his academic upgrading; he strongly felt there should be a provincial standard that would allow consistency and uniformity regardless of where a student lives and studies.

"The Only Way to Learn": Similarities and Differences between Upgrading Preparation and Post-Secondary Studies

All of the participants, with the exception of Steve, whose courses were exclusively instructor-led, described computer literacy courses in their academic upgrading preparation that combined a curious mixture of instructor-led and self-paced formats. Most participants described a modularized format in which computer competencies were demonstrated by an instructor and then self-directed work was assigned over a period of time culminating in a unit test. Passing the course meant attaining a passing grade in each module. Jack, Albert and Theresa, who all went to the same institute, were particularly enthusiastic about their instruction, especially the slower, easier pace , the ample tutor support inside the regular class time and outside it and the clear instructions which were usually outlined on the board or in a hand out and then demonstrated. From the participants' descriptions, the instructional design of the course was highly linear or "step by step" as Theresa described it. The loosely self-paced format was not without its stress. Albert states, "It was stressful because I put a lot of demands on myself and computers is one thing I was concerned about because I lacked any knowledge when I first started the course."

Unit tests were set, even though progression was self-paced. Failing meant repeating the content while the rest of the class moved on. In this respect, the approach was similar to competency based technology courses that Jack encountered in his Microsoft certified training; units were covered weekly with regular tests and failure meant financial penalties for retesting and the added burden of restudying the content in addition

to covering new material. The clear objectives and the modularized format of the academic upgrading computer literacy courses approximated the environment of other technology based programs such as the computerized accounting course Mary was enrolled in. At the time of the course, the participants found it sufficiently challenging but, in retrospect, it did not compare to the post-secondary environments in which many of the participants found themselves.

Part of the problem may be that some of the academic upgrading programs "taught" too well. Participants described environments where instructors related the applications and learning process to students' every day lives to motivate and allay phobias about learning technology. Instructions were clearly outlined and tutorial help was readily available to ensure student confidence and success with technology. Students did, at times, fail the course, but it was, in Albert's view, an issue of participant motivation and not curriculum or instructional weakness. The course was designed for success of learners who put in the effort and to make them feel enthusiastic about their accomplishments. Albert states, "The good experience was passing that computer course. It was really good. I was proud of myself for accomplishing that."

These instructional strategies were not as clearly adhered to in highly technologically intensive environments. Some or all the participants described courses where the content was dry and presented in an unvarying lecture format or demonstrated with little time to practice or solidify concepts learned. Steve quit his program after one year because of the workload. Jessica, Mary and Jack all noted high levels of frustration amongst fellow academic upgrading graduates within their chosen post-secondary

programs; Jessica was the only one of three students from her academic upgrading program who was still enrolled at the end of the second semester in her computer programming course.

Perhaps the most difficult adjustment to make was the need to be a more independent or interdependent learner in the post-secondary environment. Jack states:

> I found that when I was going to name of academic upgrading institute, that the way I handled myself with regards to how I managed my time and my course studies, I just went with the flow. Like treat me like a cow, you tell me what to do and I'll do it. I just did what was needed . what was required of me....It was more relaxed in comparison to name of post-secondary institute. It was a little more condensed than what kids are used to going to school, but the instruction was quite a bit different.

Not only did participants in highly technologically intensive environments need to be self-directed, they required experiential learning projects where "step-by-step" instructions were not used. Steve states:

> Well hands on is the only way you learn a computer - let's face it...it is a lot of trial and error, there's a lot of experiential stuff. You have to grasp a computer five or ten times and learn what its about - how do you get it back - what happens ...what's causing it to crash.

Interdependency with fellow learners was also required extensively in some programs. Steve reports:

> The team work aspect was really emphasized. Really, the only way to get all your work done is to do it with sort of a study mate. There was no way you could possibly get it done..You got a new assignment or you know, split up the assignment. You do this, you do that. That was a big part of the program was just team working because technology

> seems to move things much faster and people work together much more closely.

As discussed earlier, this was not always an easy process for people like Steve, who described himself as feeling disadvantaged:

> I relied with other students who were also feeling maybe left out.. A guy from Guatemala or whatever and an excellent Chinese lady who trained as an engineer in Thailand and was husband hunting. We did the best we could, you know. That's how we coped.

Finally, the post-secondary environment required learners to be more assertive in expressing their needs. There were no assigned advisors or tutorial time. It was up to the participants to ask for extra help if they needed it and to know what questions to ask. Jack compared the academic upgrading environment to the post-secondary learning environment:

> Well, with the name of the academic upgrading institute, they had one hour periods or however long those periods were that we had a tutor - there would be a bunch of people in there doing their homework and studying or whatever and there was a tutor in the room...Now that was excellent. It really was. At the name of the post-secondary institute, when you found the time and an instructor, you could quiz them and they'd be there to help you...They were always willing to help you at least.

"Life is Hard": Policies and Resources to Support Learners

The discrepancy and problems encountered by learners who had trained on MacIntoshes and found themselves learning with PC platforms were described earlier. The differences caused stress, however, the participants were able to compensate. Given the restricted funding available to academic upgrading programs which have invested their

hardware budget into Mac's, a change to PC's is desirable, however, not immediately needed.

A bigger issue was the limited amount of resources available for students to practice with technology, prepare assignments or gain familiarity with applications and the Internet. All student labs at all academic upgrading and post-secondary institutes doubled as instructional labs cutting down on the amount of time available for out of class student use. In some cases, labs with the newest equipment were restricted to instructor-led use only. Various institutes handled the problem differently. Some instructors allowed outside students to use unoccupied terminals at the back of the lab. Others were strict in prohibiting this type of use. Several institutes had policies of booking computer use for periods of time. Albert reported no problem with this policy; although other computer users stayed past their allotted time, he did not find it a problem to ask them to move. Mary and Jessica, on the other hand, loathed the appointment time system. They were reluctant to ask other users to vacate and depended on staff to make the request. In some labs, staff were available to do this and obliged. In other cases, staff declined as did one person who, when asked by Jessica to remind another user that his time was up, exclaimed, "Life is hard. Ask him yourself." Mary rationalized the difficulty in getting a place even with booking procedures as follows: "You go and, you know, speak to the staff - they come and remind people that there are others, but there's nothing you can do. It's free access."

Another issue was the lack of computer knowledge of staff members. This was particularly true of students accessing institution libraries. Several participants lacked the

knowledge to do proper searches and two reported asking for assistance from library staff who were unable to help them. Mary reported frequent technical problems which staff were either unable to assist with or technical support was unavailable. She states:

> I don't crash computers deliberately, but the computers are used a lot, or there's a lot of people on the server at that time. It's hard; I tend to stay with just the stuff that I know, because there's no one around. I don't have to worry about calling a tech to help me undo something I've done, so I can't get overenthusiastic about checking other things on the computers.

The above indicates a situation where computer availability for non-computer users is at a premium and staff are not always knowledgeable or available to help. Given the need to practice with technology in order to become proficient, it would seem that these participants are at an extreme disadvantage. However, the participants did not see themselves as being at a disadvantage compared to their fellow students in terms of completing the course or being assessed. For all participants, their computer literacy levels were enough to manage confidently in the narrow framework of school until such time that they could work or purchase a computer. If we can assume that computer literacy is similar to general literacy, it is questionable as to whether all of the participants are the best judges of their skills in this area. Malicky, Dieleman, Campbell, Wong and Krahn (1998) cite the International Adult Literacy Survey that indicates that people with low levels of literacy frequently self-assess their skills at much higher levels. Self-perception of computer skills may also be misjudged, particularly if the participant has no other environment or members of a social network with which to do a self-comparison.

A lack of hardware is not always an issue that institutions can do something about. The environment is also changing so rapidly that it is difficult to make an observation that will continue to hold true. Steve observes about his post-secondary experiences, "They were adding computers all the time." Training staff to be knowledgeable about frequently encountered questions and problems or making such information available in print format for self-reference is an ongoing strategy that adult educators can ensure is in place. Such a strategy should be developed with the needs of the most disadvantaged students in mind. Training students adequately through workshops, online tutorial or peer teaching would ensure that people had some familiarity with search engines and would know about features such as web based email in the absence of a provided service by their institution.

"Thank God for my Wife": Support for the Financially Disadvantaged Learner

Currently, funding formulas add to the difficulties financially disadvantaged adults have in their post-secondary studies, particularly those who have chosen highly technologically intensive programs. At the time that this research was conducted, Student Finance provided extra funds for high need adult learners for one to two years of their post-secondary studies (Advanced Education, 1999). Programs have developed offerings which compress curriculum that requires a longer duration into a one year format. Jack described his workload as eighty to one hundred hours per week:

> Thank God for my wife or I'd have never done it. If I had been a single parent, there would have been no way. It's a two year program that runs ten months and I think their planning of the curriculum from part of my work that it's a screw up right from the start. It's just terrible.

It is interesting to note that Jack observed that single parents without the resources that he enjoyed would never be able to get through his particular program. Steve described a similar problem with his Engineering program, which had a high drop-out rate over its duration.

As described earlier, pacing and high stress were a feature of all highly technologically intensive environments. There was no time for family emergencies or other situations that might come up. The financial pressure was also intense. Jack, who was able to refinance his house to ease the pressure and concentrate on his studies states:

> I think if I were a student that wouldn't have been in the position [being able to refinance my house] I was in, that if they couldn't pay, that would have screwed them right on the spot...I can recover from it.

It is ironic that student financing designed for high need financially disadvantaged students may, in fact, indirectly divert these learners from the most technologically focussed areas where financial and income security are highest. If programs have repackaged their curriculum to fit into twelve or twenty-four month formulas, it would be logical to assume that content must be compressed, review material necessary to fill in the gaps for some students may be excluded and the process of learning quickened in such a way that certain concepts may be difficult to solidify in the minds of the learner. While this is, no doubt, stressful for all students, it may particularly impact financially disadvantaged students in these environments.

While student financing formulas may be problematic, students also reported positive experiences in their learning. Jack reported an experience with a counsellor who

noticed that his student finance application had not requested the full amount that he was eligible for under the new guidelines. The counsellor was able to act as an advocate for Jack to ensure he received the full amount due. It was an instructor who informed Albert of the possibility of getting a computer on loan through a Worker's Compensation Board program. The information referral and advocacy roles that these two staff members were able to contribute went a long way to alleviate the problems of these two students.

For some students, however, the difficulties that financially disadvantaged students encountered were not easily overcome. Albert shared the difficulties that his own daughter had in attempting upgrading. Albert thought the stress due to the low living allowance in her student finance grant made it difficult for her to concentrate and continue. "My daughter went there for upgrading and in order to survive, and this isn't like my daughter, she was smoking cigarettes out of ashtrays and stealing vegetables out of gardens and living on noodles." While this observation may have nothing directly to do with financially disadvantaged adults in technologically intensive environments, it does indicate that for people who, for whatever reason, are living in extreme poverty, the solutions to their educational needs are more complex.

In summary, my concerns regarding technology access for the financially disadvantaged, the question which initially sparked my interest in this research, did not emerge as the urgent theme I thought it would be. The initial survey conducted at the beginning of my research indicated that computer ownership among the financially disadvantaged lags behind the general population, however, ownership rates among the disadvantaged appear to be increasing. The survey also indicated that non-owners in the

financially disadvantaged community lacked the means to gain access to technology through their social group or work situations.

Financially disadvantaged students in post-secondary environments are obtaining access to technology through a variety of means, even though obtaining this access was, at times, very difficult, especially for those in highly technologically intensive programs. Since most participants relied on institutional labs or were very recent computer owners, they often felt that their computer literacy was, in most cases, not on par with fellow students during certain points in the program. Gaps in technology access and literacy were most acute for students in highly technologically intensive environments. Despite these gaps, none of the students saw themselves as hindered in achieving educational equity. In other words, the roadblocks did not prevent these students from passing their courses and reaching their educational goals. Financial and institutional support services play an important role in ensuring that access and equity are maintained for these students through the provision of labs, student loans and instructional support. Modifications can be made to enhance these and this will be discussed in the next chapter.

While the research questions did not unearth issues of an urgent nature, the discussions with the participants did provide interesting data regarding student experiences with technology and ideas to provide a more effective educational experience for the financially disadvantaged given the increasing use of new information technologies in post-secondary environments.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

This study confirms that ownership of computers among the financially disadvantaged lags behind the general population, however, it also indicates that computer ownership in this subgroup is increasing at a rate similar to the overall population. Interviews with the participants indicate that many adult students planning to go back to school are able to save for technology purchases and do not find the current cost unreasonable. Those students who are not able to purchase computer systems rely primarily on institutional labs and other community services. Access is most difficult for non-computer owners in highly technologically intensive programs. Since many financially disadvantaged adults are, at best, recent computer owners, they often perceive their computer literacy as substantially behind the computer literacy of fellow students. Despite the gaps of technology access and computer literacy, these students were able to pass all course requirements and usually felt that they were able to bridge these gaps to keep pace with fellow students and fulfill their educational goals. Financial and institutional support continue to be a crucial element in ensuring that access to technology is available for all students and that equity for disadvantaged groups is maintained as new information technologies are introduced. While the issues of access and equity were not urgent in the minds of most of the participants, other interesting themes did emerge from the data related to these questions and these will be explored more fully in this chapter as will policy and program strategies.

The connection between technology literacy and financial security is well entrenched in the minds of many of the participants. For those most concerned with changing their economic circumstances, it was important to not only be computer literate, but to also study in a computer related field to take up a more powerful or secure role in the knowledge economy. It is apparent that the conclusions reached by Krahn and Lowe (1998) regarding "good jobs" and "bad jobs" has, to some extent, been noted by financially disadvantaged adults and certainly shapes the career choices of many learners in this income bracket. Krahn and Lowe's analysis of the Canadian workplace states that underemployment through overqualifications, contract work and involuntary part-time employment is a feature of the current workforce. Given the need, according to Shanahan (1992), for the financially disadvantaged not just to develop skills to fill market niches, but also to organize and use information technologies to produce to one's own advantage, it is interesting to note that only one participant had a desire to become entrepreneurial and use technology to build his own future and that of this community. Steve states:

> There's federal funding for this [online resources for economic development]. Every town should be on. This is a technology where small, isolated communities are supposedly to get economic benefits for having or being online. Either they promote themselves or tell the world who they are, otherwise nobody knows you exist right?...Right now there are guys that make $5, $6, $7, $8,000 a month and have no education at all. They only do that for 90 days and it sort of fits in with the sort of traditional trapping kind of pattern. You work for 90 days and then you take whatever you can get. So, if a computer can help that out...I'm sure in some ways...What can a computer do?..It can explain things, it can name business plans, tell other people about what you do or where you live and he [the trapper] might have a lot of good stories to tell

> if he had one of those box things you know? He could tell that story in his own accent...and somebody would just be dying to hear it. I think that's what it's for, isn't it? If they can get one, if they don't, they're left out. Hey, everyone should have one.

Many of the participants are headed for uncertain futures and seem unaware. For example, Theresa did not have any opinion or any knowledge on how technology was impacting the banking industry. Even for those in the highly technological careers, the understanding of the volatility of the economy was unappreciated because "it's easy to find a job." If the role of adult education is to help learners reach their potential, then part of an information technology curriculum must focus on how to use technology to one's self-improvement with or without secure employment.

All participants, whether their program was highly technologically intensive or not, thought it was necessary to have a computer in their post-secondary studies, although not in their academic upgrading program. Three of the participants owned functional computers, one had a computer through Worker's Compensation and two were completely dependent on institution labs, which were overcrowded during peak times. While dependency on labs was inconvenient, it was adequate for those students who could use them late at night.

Computers are proliferating in Canadian homes. While still a major purchase for those on limited incomes, it is one that most can save for and are willing to make the sacrifice to do so. Functionality is a concern, especially for those in highly technologically intensive environments. Student buy/lease plans are admirable, but should only be considered for the highest need individuals, such as low income single parents in highly

technologically intensive programs. The interest non-computer owners have in purchasing systems at the time of entry into a post-secondary institute could be leverage for negotiating better deals for academic pricing of hardware and software.

Physical access to technology is but one feature of the necessary conditions of computer literacy. General knowledge of how to operate a computer, what it does and what its potential is comes from exposure, use and the information exchange from one's social group. In low income areas such as the inner city or in subsidized housing complexes, physical access and general computer literacy are limited, but this is changing. Menchaca (1997) and Milio's (1996) ideas around empowerment of individuals through community access have real possibilities for participants such as Mary and Steve. Equipping community centres with a minimal amount of hardware and software as well as sponsoring programming similar to other forms of literacy education is a low cost method of ensuring that the cultural capital needed to be technically literate is available to the disadvantaged.

The cultural capital of computer literacy is a crucial concept. Without it, participants were hindered in the knowledge of basic computer operations and in their ability to make computer purchases, were at a disadvantage in their course work and found it more difficult to complete highly technologically intensive courses as easily as their peers. An interesting finding in this study was the potential of new technologies to provide emotional support for students during their studies and increasing the likelihood of their success. The irony is that three participants had never even used an email system

during their studies. Steve, who was the most isolated from family and friends, was unaware of how to access free web based email.

Institutions have long expected a generation of technically fluent students to hit the campuses every year. While many students do fit this description, many do not and of these, many financially disadvantaged adults cite fundamental gaps in their computer literacy. Pre-course workshops or non-credit courses running concurrent to other courses are a wise investment and not necessarily significantly expensive if run on a peer tutoring model. At the very least, institutions should ensure that all students sign up for commercial web based email and have experience with this communication tool.

Computer literacy as an equity issue for the financially disadvantaged depends on two factors: computer ownership and the intensity of the technological environment of the adult learner's post-secondary program. Inequity resulted in lower levels of literacy, however, the disadvantage these students faced was not so substantial that the playing field could not be evened out by a determined, hardworking person, at least in terms of successfully competing for grades. The impact of lower levels of literacy did have an affective component: participants felt like "losers" or that they were "not keeping up." Technological literacy is very much linked to status. As Krahn and Lowe (1998) have documented, one's technical literacy and the manner in which one uses technology in the workplace correlate with one's economic returns, both present and future. While the inequity in literacy skills caused by non-computer ownership is mild in the school setting, it may well be a more substantial barrier to gaining employment or demonstrating competence in a workplace setting.

Unlike general and numeric literacy, "computer literacy" is a difficult concept to define. What constitutes a computer literate person is constantly changing as new technologies are added. Those participants in highly technologically intensive programs who were non or recent computer owners felt they had gaps in their computer literacy at least at certain points in their program. Jessica, with her recently purchased computer, was able to close the gap quickly and felt confident by the end of her first year. Steve gained exposure and confidence in a work situation. Only Mary, the most extreme technology "have-not" in the group actually saw her skills decrease in comparison with her classmates. As she proceeded to intermediate and advanced courses, her lack of background and expertise made the courses more difficult. Her family concerns made it difficult to use institutional labs at non peak times. Mary's case is unusual and problematic for institutions. Her literacy level made her studies difficult, however, she was able to pass all of her courses. The extent to which institutions can respond to the needs of such individuals is limited. Given the general perception from students that a computer is necessary, it would seem that provisions for a technology purchase through student finance programs for high need individuals in certain programs would be most appropriate to consider.

All participants who did not own a computer or had only recently purchased one were readily able to identify gaps in their computer literacy levels. Many students anticipated potential problems and their planning enabled them to manage these barriers. Participants should plan towards their future goals while goal setting and career planning courses offered in academic upgrading programs should encourage students to consider

the level of computer literacy needed according to the intensity of the environment of their future program. Learners should be encouraged to identify means to increase their exposure through savings, shopping, identifying local resources and time management. Finally, students should be aware of their personal learning styles with the goal of applying effective learning strategies and study techniques. I realize that this is a point that can be made in any study pertaining to education, but it is, perhaps, more true when talking about information technology literacy. Adult upgrading students, particularly those bound for highly technologically intensive environments, will be studying with young adults who have grown up with computers in their homes and have the cultural capital needed to be successful. The financially disadvantaged students will need to develop an experiential approach to broaden their trouble-shooting skills and apply sound self-study techniques to fill in the gaps in their backgrounds. Research and evaluation of programs combining technical content and learning strategies to study in more intensive environments may be an area for further discussion, research and piloting of programs.

Staff in institutions can go a long way to minimize the discomfort financially disadvantaged adults feel. Sensitivity to the fact that computers are not ubiquitous when conducting beginning of the term needs assessments and bending the rules with lab access are simple ways to accommodate these needs.

Resta (1992) stresses the importance of having faculty and staff from "minority groups," a term used synonymously with the income disadvantaged in his work, to provide role modelling for disadvantaged adults. Steve's description of his employer fits the description of a mentor who facilitates the learning of a discipline. His mentor made the

difference between the frustrating school setting where Steve felt "left out" and an environment of true learning. Hiring lab staff or instructors from this type of background or pairing students with employers with an understanding of this background for practicums, while not always possible, would be an idea worthy of consideration when these decisions need to be made.

As detailed previously, financially disadvantaged adults who are motivated to upgrade their education are very much interested in technology related careers. Those selected for this study began this process in academic upgrading institutes where, perhaps, the philosophy focusses on the humanistic area of adult education. The curriculum, instructors and support services have the goal of fostering adults, often high need individuals, in a variety of ways to realize their educational potential, despite their previous bad experiences with learning. A successful experience is the goal. This is a contrast with the techno-rational focus of many technology related programs that cater to the specific demands of industry. A different focus necessitates a different standard, a different instructional approach with content experts rather than adult education specialists and a different pace. The "feel good" curricula, which builds self-esteem and provides students with the experience of academic success, while appropriate for many students initially and for those not continuing to post-secondary studies or for less demanding programs, is misleading for the many students bound for highly technologically intensive post-secondary environments. These students, and it would appear that this is not a small group, need a more demanding pre post-secondary school experience.

Who is responsible and capable of their preparation is not easily answered. As suggested earlier, academic upgrading programs could develop streams with more advanced courses for those bound for high intensity environments. Academic upgrading institutes, however, are somewhat ill prepared to enhance their course offerings in terms of the content. While it may seem expedient to suggest that academic upgrading institutes should fill these student needs to prepare graduates for their academic goals, it is the highly technologically intensive programs that have a vested interest in ensuring that these students are successful. Freeman (1997) notes that the general student population is changing in the post-secondary environment and non-traditional students may well start filling post-secondary campuses. A pre-course experience for these students is a model used by the University of Wisconsin (1996) to encourage diversity and one that may have possibilities in its adaptation.

Most participants felt enthusiastic about the quality of their instructional experience in academic upgrading programs but were neutral to disappointed with their instruction at the post-secondary level. Jack described some instructors who "...would do a lot of reading out of the binder, which burned a lot of people." He states, "...it ticked me right off. I get nothing out of somebody reading to me. It puts me to sleep!" While demanding programs such as engineering or computer programming must first hire content rather than instructional experts, a sound faculty development program that encourages the enhancement of teaching skills is needed at least in some programs; this may improve instruction in the traditional sense.

Another form of instruction in the non-traditional sense is mentorship. Pairing students with experts in the field, as discussed earlier, would give a pragmatic experience to enhance theoretical learning and provide a technically competent social network to those who may lack this in their personal lives. Improving instructional quality, while providing additional services to non-traditional students, increases the opportunities of such programs of falling into the "Unified" rather than the "Populist" perspective (Bergquist, 1995) as these students increase on campus.

In preparing for non-traditional students such as the financially disadvantaged, it would help if we were "on the same page." The development of standards and common competencies in computer literacy will ensure that there is consistency in quality and enable the relocation and transfer of students between programs more easily.

Technology budgets are rarely adequate to meet the diverse needs of staff and students. Due to quick evolution in the industry, it is difficult to make long range plans. Seamless delivery of technology programs should be a goal and academic upgrading programs should be making long range goals to convert to a PC platform. The overcrowding of lab facilities during peak times is problematic for single parents, and, as discussed previously, the provision for technology hardware purchases in student loan applications should be considered for high need single parents enrolled in highly technologically intensive environments. While unpopular, booking computers for restricted times may be the only policy to ensure some equal distribution during peak times. In a perfect world, lab and library staff would be adequate to monitor usage and knowledgeable about technology to field questions. Institutions may provide this service

cheaply through lab proctors hired from the student body through peak times only. Work experience for computer based programs also provides computer access off site. This type of program is also valuable in providing a realistic, industry based setting in which participants may more accurately assess their skills and learning needs.

As indicated earlier, current student finance formulas for high need students may, in fact, be a barrier for students seeking careers in "high tech" industries. Students may choose technology based programs because they are of a short duration, as did Jack, who said, "My biggest concern was if I was going to take something, I wanted to go the fast track and do it the way I did." The short duration may be too compressed to adequately cover the content without doubling the workload and skipping the fundamentals. When I embarked on this study, I was challenged to develop solutions which would not require the infusion of increased funding, which may or may not be available from the provincial ministry. As students clearly do need more financial assistance to support them through a second or third year of studies in some programs or even to manage their studies in a less stressful way, perhaps another source can be found. High technology industries routinely report the scarcity of qualified people to staff their growing industry. Companies in these industries could jointly sponsor scholarships, mentorships and paid work experience programs for high need individuals.

Recommendations for Future Research

I found it particularly difficult to make statements about the participants in this study as they were all so different. Different lengths of time of computer ownership, levels of access and programs made comparison awkward. The changing nature of the post-

secondary campus as technology is added complicates the drawing of any conclusions which can stand the test of time. Interviewing people about their perceptions of their literacy without some type of test is difficult. I suspect computer literacy is like other forms of literacy and people who lack access or consistent exposure are unable to accurately self-assess themselves.

I would, therefore, suggest an extension of the above research using a case study approach. In a case study approach where participants, bound for the same highly technologically intensive program, selected in the final four to six months of an academic upgrading program and then interviewed after the first semester of their post-secondary program would give some consistent background from which more conclusions could be drawn. The students' perception of what took place in their academic upgrading and their post-secondary program could be tested against each other and against staff at both institutions. Participant grades and a comparison between these and the program median would be useful in comparing self-perception of computer literacy and real results. This research would, no doubt, be more appropriate at the doctoral level.

A second area of future research emerged from the initial survey. A sizeable proportion of financially disadvantaged students at the academic upgrading level lack any kind of access to technology through ownership, social networks or work. The extent to which lack of technology access determines the future academic plans of students is unclear. Research questions could explore whether lack of access to technology influences students to pursue less technologically intensive post-secondary programs or to postpone their studies until a later date.

Closing Statement

In closing, financially disadvantaged adults interested in improving their economic status are very interested in information technologies and frequently focus on this area when making a career choice. While there are definitely technology access issues for financially disadvantaged students, they were only significant for those in highly technologically intensive environments. These participants employed a variety of strategies to close the gaps of technology literacy and access and did not perceive themselves as disadvantaged in terms of passing their courses or realizing their educational and vocational goals. Academic upgrading programs can enhance student success for their students bound for highly technologically intensive environments by providing streams so students can close some of the gaps between themselves and mainstream students as well as experience the intensity of learning such content. Post-secondary programs in areas of high technology intensity may wish to have pre-course workshops or seminars to provide a bridge for disadvantaged students in their programs.

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APPENDIX

Information Technologies Survey

This survey will be used to find out how adults returning to school and living on limited budgets manage access to information technologies. The term "information technologies" refers to computer hardware, software, the internet and other tools used to communicate and manage information.

Your participation is voluntary and confidential as no names are required to participate. If you do choose to fill out the survey, the information you provide will be part of a study on adult learning with technology. It is hoped that the information that you provide will be useful for learning institutions and financial assistance boards in implementing programs or policy changes.

Survey

1. Do you own a computer?

Yes ☐ **If you answered "Yes", please go to #4**

No ☐

2. Do you have access to a computer through family, friends or work?

Yes, whenever I want ☐

Yes, but limited ☐

No ☐

3. Do you plan to buy a computer within the next 12 months?

Yes ☐

No ☐

4. Whether you own your own computer or use one through friends, family or work, do you have internet access on the computer you use?

Yes ☐

No ☐

5. Do you currently receive financial assistance from the Student Finance Board?

Yes ☐

No ☐

6. Are you planning further post-secondary study after you finish your program?

Yes ☐

No ☐

Thank you for filling out this survey.

Solicitation

As a graduate of the Academic Upgrading program at [the Name of the Institute] who has continued on to further studies, you have probably faced many challenges as an adult learner. Some of these challenges may have been in adjusting to learning and some may have been financial.

Like you, I am a student, who is at the University of Alberta doing a study on the experiences of adult learners living on limited budgets and how they manage their studies in increasingly computerized environments. By "computerized" I mean using a computer to prepare schoolwork, communicate with your instructors or get information over the Internet. Having access to a computer or the Internet is becoming an important part of being a student. You have important opinions and experiences to share on being an adult learner in this kind of environment. I would like to draw upon this information to find out

- Whether you ever need a computer or Internet access in your current program.
- Whether you have convenient access to a computer or the Internet at home or through other means.
- If computer or Internet access has been an issue in your studies.
- Your ideas on what kind of computer literacy is needed to be an adult student.
- How helpful government or financial services or school based programs have been in helping you gain access to computers or computer literacy.

I would like to arrange an interview with you about these questions. [Name of the Institution] has generously offered to help me by mailing out this letter. I do not have access to your name or any other information. If you agree to help me by giving an interview, I will not use your name in my report.

Your interview will form part of a study on adult learning and technology. It is my hope that it will be read by people who have the influence to change and improve services for students. I invite you to call me at [my phone number] to contact me or leave a message. Phone collect if you are out of town. From there, I can answer any other questions you may have about the study and arrange an interview at your convenience.

Thank you and I look forward to talking to you.

Sincerely,

Ellen Whybrow-Howes

Consent to Participate

Participant
Name:_____**Date:**_____

The purpose of this study is to gain an understanding of the perspectives and experiences of economically disadvantaged adult students to their studies using information technologies. It is hoped that the information you give me will be useful for learning institutions and financial assistance boards in implementing programs or policy changes.

As a participant in this study, you will be required to answer questions in an interview with me which will take 45 minutes to an hour. With your permission, the interview will be taped. The purpose of the audio-tape is to help me remember all the details you give me. The audio-tape will not be shared with any of your instructors or anyone else. Within 3 months of our interview, I will contact you again to provide transcripts and summaries of our conversation to ensure that the information is accurate. You can change or veto any part of the conversation.

You may withdraw your consent to participate in the study either before, during or after the interview. If you wish to withdraw after the interview has been held, you can contact me at my telephone number.

If you wish, you will be provided with a summary of the findings, conclusions and recommendations. You will find that certain references, such as the name of your school and your name, have been altered to protect your anonymity. Please contact me at the above number if you wish to have a copy mailed to you.

Thank you for agreeing to participate in this study. I appreciate your generosity in sharing your time and insights. I hope that you find the process to be enjoyable and rewarding.

I, _____acknowledge that I consent to participate in the study described above.

_____ _____

Signature Date

Interview Guide

Introduction

I am doing a study related to information technologies in order to complete my master's degree at the University of Alberta. What I mean when I use the term "information technologies" are computer hardware, software, internet access and other tools used to communicate and manage information. These types of tools can be quite expensive and for students living on limited budgets, it can be a challenge to own or gain access to the required tools.

The purpose of this study is to gain an understanding of the perspectives and experiences of economically disadvantaged adult students to learning using information technologies. It is hoped that the information you give me will be useful for learning institutions and financial assistance boards in implementing programs or policy changes.

This is not an evaluation of your instructors or the program that you are studying in. Rather, it is to gain information on your perception of your needs and whether or not you believe that your needs are being met.

Background Information First Name_____
Tel:_____

Family Status:_____

Age: ____18-25 _____ 26-35 _____36 - 45 _____46-55 _____56+

What program are you in?_____ Fulltime? _____

How long have you been in this program?_____

When do you anticipate finishing?

_____

What made you decide to enroll in this type of program?

What are your educational goals when you finish?

What occupational goals do you have?

Computer Ownership & Access

Do you own a computer? _____

If no

- How do you manage to arrange access? How convenient do you find this arrangement?

- Do you get access through friends or family?
- Do you plan to purchase a computer within the next 12 months? Why?

If yes,

How long have you had one?
Why did you buy one?

Do you have internet access? _____

If no

- How do you manage to arrange access? How convenient do you find this arrangement?

- Do you get access through friends or family?
- Do you plan to get access within the next 12 months? Why?

If yes,

How long have you had internet access?
Why did you get on the net?
What things do you typically access through the net?

Please describe the computer you use most often. (Have fill out Section A)

Computer Use & Skills

What courses are you currently taking?_____

_____

_____

What applications do you use for course-related work?

Word processing papers _____ Yes _____No
Multimedia Development _____ Yes _____No
Developing Presentations _____ Yes _____No
E-mail _____ Yes _____No
Desktop Publishing _____ Yes _____No
Electronic Conferences _____ Yes _____No
Internet Access _____ Yes _____No
Simulations or Games _____ Yes _____No
Library Research _____ Yes _____No
Programming _____ Yes _____No
Statistics _____ Yes _____No
CAD/CAM _____ Yes _____No

On average, how many hours do you use a computer each day on course related work?
___<1 hour _____1-2 hours ____ 3-5 hours >5 hours

Instructional Preparation

You said that at _____(name of post-secondary program) you used a computer for _____(as stated above). What exactly do you do with this program?

- Did you know how to use this application before enrolling at _____? How did you learn? (If learned in the Academic Upgrading program- How were you taught?)

- (Experience Question) If I had been in your academic upgrading program learning this program, what would I be doing? What would I see the instructor doing? What materials would I be using?

- (Opinion Question) How would you rate your skill when you finished learning this application? In your opinion, do you think it was enough for your current program?

- (If in an Academic Upgrading program –How was this application used in other courses in your program?)

Perspectives and Experiences on Computer Literacy in a Post-Secondary Environment

1. I would like to ask you some questions about when you first enrolled at _____. When you started your program, how do you think you overall computer skills measured up to what was typically expected by your instructors and the institution?

- What skill areas would you have liked to have had?
- How did you manage with those gaps?
- What do you think would have enhanced your preparation further?

2. You had talked about how you were taught different skill applications in your academic upgrading program. I would like you to describe how you would use these applications in your current program.

- If I were to watch you or other students in your program learning with these applications, what would I see?
- How might this be different from the way in which you had learned in your previous program?
- How effective is this manner of instruction in terms of helping you learn the overall content?

3. In what way do you use information technologies such as the computer or the internet to enhance your learning? (i.e. additional research, researching scholarships, communicating with others, presenting your work)? To what extent do you feel proficient in using IT to enhance your learning?

4. In what way do you use information technologies such as the computer or the internet to enhance your life? (i.e. finding work, getting information necessary to be a parent, citizen etc.)? To what extent do you feel proficient in using IT to enhance your life?

5. What experiences, both good and bad, have you had in using information technologies in your studies?

6. How would you rate your computer literacy preparation to continue on to employment? _____ If no,

- what barriers do you think are in your way to achieving sufficient computer literacy for your goals?
- what would enhance your preparation further? (Probe: **Instruction** (what kind? individual, selfstudy, group training **Computer Access** What kind? campus. loans

Educational and Financial Support Services

1. What are your experiences with using computers at your current institution? In what way could the institution improve computing services? (Instruction, access)

2. What were your experiences with using computers at _____? In what way could the institution improve computing services? (Instruction, access)

3. What other support services would you find useful in assisting you with computer access or literacy? (Give examples if necessary--government services such as Student Finance, Freenet societies, libraries,)

Section A

Which of the following describe the computer you own or use most often? Check one.

IBM_____
- Pentium___
- 486_____
- 386_____
- 286_____

Don't Know_____

Apple_____
Power PC_____
Quadra_____
Mac_____
Other ____

Don't Know_____

Memory Circle one.
>64 MB >32MB 24-32MB 16-24MB <16MB Don't Know

Hard Drive Circle one
>4 GB >2GB 1-2GB 200MB - 1GB <200MB Don't Know

Modem Circle One
>56.6 K >33.3K 28.8K 14.4K or less Cable Modem None Don't Know

Operating System Circle one
Windows 3.1/3.11 Windows 95/98/NT Mac O/S Unix Other Don't Know

Do you have

a CD-Rom _____Yes _____No
a printer _____Yes _____No

Initial Interview Summary Sheet

Date:_____ Participant's First Name_____

1. Description of Participant (Stats, Life circumstances & pertinent past history, future goals)

2. Significant Themes or issues in the contact?

3. What part of the research question did the participant's interview cover?

4. What new hypotheses, speculations or guesses about the field situations were suggested by this interview

5. What type of information should be sought in the next interview?

Adapted from Miles & Huberman's Contact Summary Sheet in Qualitative Data Analysis: A Sourcebook for New Initiatives